Description / Goals

Nuxeo Drive handles synchronisation between a Nuxeo Server and a user’s file system. Synchronisation goal is to maintain an identical state between server’s repository and user’s file system. This “identity” is evaluated in a projection space where Documents (File, Picture, Video, custom ones) become files and Folders, Domains, Workspaces, documents become folders.

The state of each of the synchronised parts is altered because of some user actions on those objects.

User’s File System:

- Actions on “files”:
    - Creating
    - Renaming
    - Saving
    - Moving
    - Trashing
    - Untrashing

- Actions on folders
    - Creating
    - Renaming
    - Moving
    - Trashing
    - Untrashing

Nuxeo server:

- Action on “Leave” (File, Picture, Video, …) documents
    - Creating
    - Changing the main file
    - Locking
    - Unlocking
    - Moving
    - Trashing
    - Untrashing
    - Deleting
    - Removing the main file
    - Giving write permission to the user
    - Removing write permission to the user
    - Giving read permission to the user

    - Removing read permission to the user

- Action on “Folderish” documents (Domain, Workspace, Folder) documents
    - Creating
    - Trashing
    - Moving
    - Untrashing
    - Deleting
    - Updating the title
    - Giving Write permission to the user
    - Removing write permission to the user
    - Giving read permission to the user
    - Removing read permission to the user

Mapping

A file is mapped to a document through a maintained mapping “local path”<-->”document id”. If we talk about object in this document, we will talk about an item of this mapping table, that has declinaison in both file and document.

Constraints

Both server and file system have some immutable constraints.

- On file system
    - There can’t be sibling folders or files with same name.
    - Read-only files cannot be modified
    - Files being accessed
- On the server
    - It is not possible to update a document if user hasn’t the write permission
    - Document is locked

Conflicts

The synchronisation engine will try to reproduce locally modifications done remotely or the contrary. Sometimes, this report of modifications lead to problems, we call those situations “conflicts”. We can separate conflicts situations this way:

- Some actions are applied on the same object, on the file system and on the server, Drive cannot determine which change should be applied in the final state and requires user choice (keep the file and update the document, or keep the document and update the file accordingly)
- Drive tries to apply some algorithmic decisions but some constraints prevent from executing them
  - When Drive tries to apply modifications on the server and a constraint (or several) prevent it to be possible.
  - When Drives tries to apply modifications on the user desktop’s file system and a constraint prevent it to be possible.

Conflicts Maps

We will separate analysis of two categories above-mentioned and for each type of objects.

Concurrent actions on file and related document

Tests and Current Results

Current results with tests on Mac OS Sierra.

Scenario **tested:**

- Disconnect the drive client
- Do an action remotely on a document with user 1. Actions are listed on the left column "Document actions"
- Do an action locally on the sync local file with user 2. Actions are listed on the row "File Actions".
- Then reconnect drive client
- Describe the result after these concurrent actions

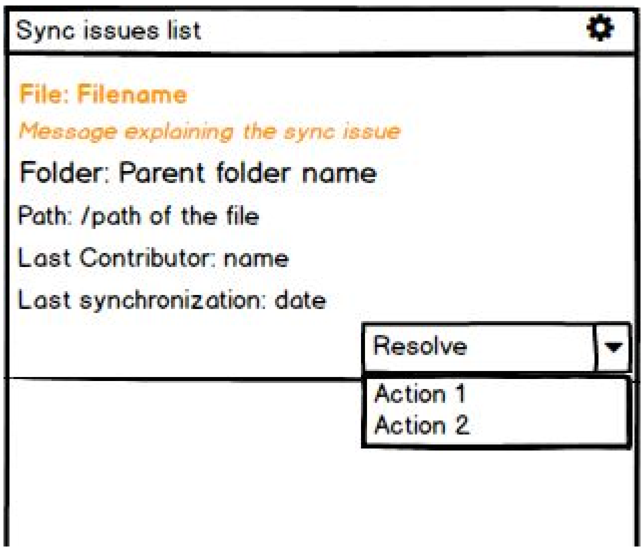
		File Actions					
		Creating	Renaming	Trashing	Untrashing	Moving	Saving
Document Actions	Creating	X	X	X	X	X	X
	Trashing	X	Locally trashed file	X	X	Locally trashed file	Locally trashed file
	Changing Main file	X	New file downloaded + file new name uploaded	New file downloaded	New file downloaded + untrashed file uploaded (replacing existing file, 2 local files, 1 remote)	New file downloade d in new folder + previous file moved remotely	Conflict detected
	Moving	X	Moved file downloaded + rename not uploaded	moved file not downloaded	X	Moved file downloade d but not uploaded	Not a conflict (merge)
	Locking	X	Renamed label remains locally + no server changes	Document remains trash locally + no server changes	X	Moved file not uploaded	Conflict detected

	Unlocking	X	Conflict detected	Trash local file + remote file remains	X	File uploaded, local move lost	Remote file download ed, local changes lost
	Untrashin g	X	X	X	Untrashed on both sides	X	X
	Deleting	X	Trashed local file	Trashed local file	Untrashed file uploaded	Trashed local file	Trashed local file
	Removing the main file	X	Locally trashed file	Locally trashed file	Untrashed file not uploaded,	Locally trashed file	Locally trashed file
	Updating	X	Updated file downloaded, local rename lost	File trashed remotely	X	uptaded file moved	Conflict detected
	Give Write	X	Local rename not uploaded	Locally trashed but not remotely	File remains trashed remotely	Local move is uploaded	Conflict detected
	Remove Write	X	Refers to constraint XX	Local and remote file remain, no changes	Untrash local file remains locally	Local and remote file remain, no changes	Local and remote file remain, no changes
	Give Read	X	Local rename remains	Local trashed remains	Untrashed file remains	Moved file cancelled	Impossibl e to save locally
	Remove Read	X	Local files trashed	Local files trashed	Not possible to untrash	Local files trashed	Local files trashed

To be implemented

For all previously listed use cases where 2 actions are done, locally and remotely, a conflict should be raised.

For each conflict, some information will be displayed to the user through the filename: an explicit message describing the conflict and actions to resolve it.


Sync issues list

File: Filename

Message explaining the sync issue

Folder: Parent folder name

Path: /path of the file

Last Contributor: name

Last synchronization: date

Message : "the file has been X remotely and Y locally" where X and Y are described on the table.
X is the action server side and Y the action client side.
Following table details the options proposed to the user for resolving the conflict, depending on X/Y actions.

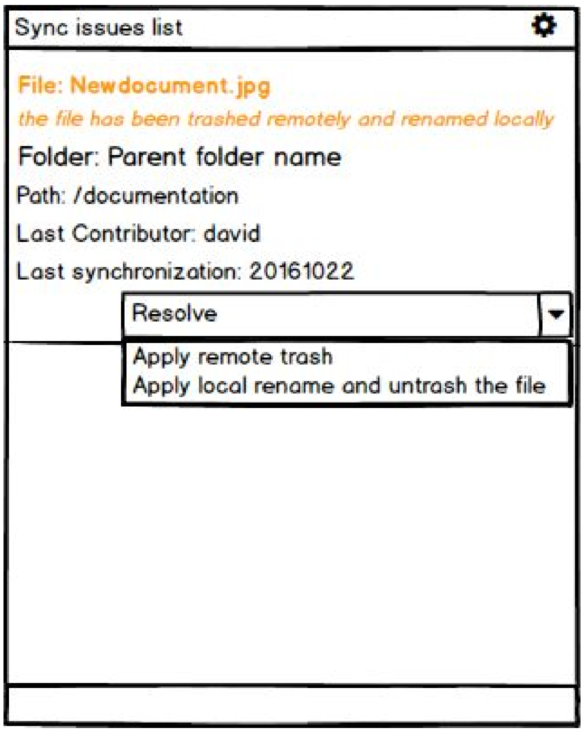
X / Y	Renamed	Trashing	Untrashed	Moved	Saved
Trashed	Apply remote trash / Apply local rename and untrash the file *(Example 2)*	X	X	Apply remote trash / Apply local move and untrash the file	Apply remote trash / Keep changed file and untrash it
Main file changed	Apply remote update / Apply local change	Apply remote change and untrash / Apply local trash	Apply remote change / Apply local untrash	Apply remote upate / Apply local move	Apply remote change / Apply local change
Moved	Apply remote move / Apply local rename	Apply remote move / Apply local trash and unmove remotely	X	Apply remote move / Apply local move	Apply remote move / Keep changed file
Locked	Refers to constraint "Document is locked"				
Unlocked	Keep remote file / Apply local rename	Keep remote file / Apply local trash	X	Keep remote file / Apply local move	Keep remote file / Keep changed file
Main file removed	Apply remote delete / Apply local rename and restore the file	X	Apply remote delete / Apply local untrash and restore file	Apply remote delete / Apply local move and restore file	Apply remote delete / Apply local change and restore file
Updated	Apply remote update / Apply local rename	Apply remote update / Apply	X	Apply remote update / Apply	Apply remote / Apply local

		local trash		local move	
Give Write	*See below the table*				
Remove Write	*Refers to constraint “Not possible to update the document without Write permission”*				
Give Read					
Remove Read					

“Give Write”: Message “You have been granted with write permissions on this file and then you can apply your local changes”.

- Resolve:
  - “Apply local action”
  - “Cancel local action”

Examples with an explicit message, with different options to resolve it :


Sync issues list

File: Newdocument.jpg

the file has been trashed remotely and renamed locally

Folder: Parent folder name

Path: /documentation

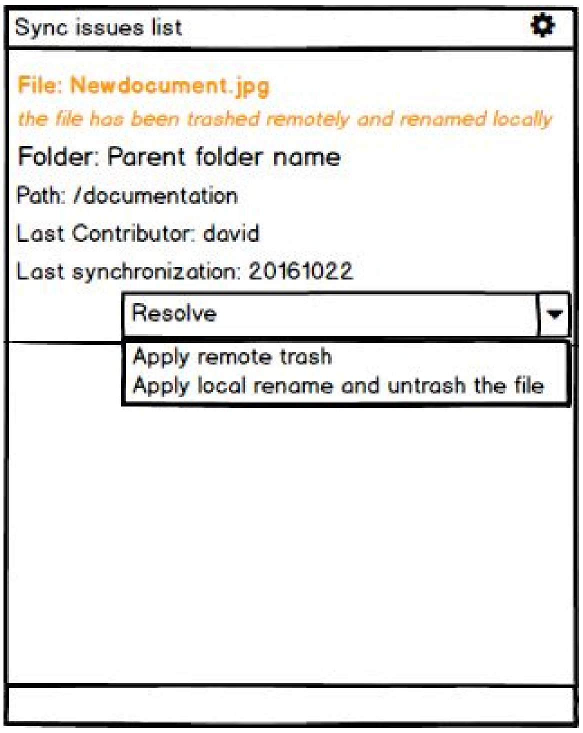
Last Contributor: david

Last synchronization: 20161022

Resolve

Apply remote trash

Apply local rename and untrash the file


Sync issues list

File: Newdocument.jpg

the file has been trashed remotely and renamed locally

Folder: Parent folder name

Path: /documentation

Last Contributor: david

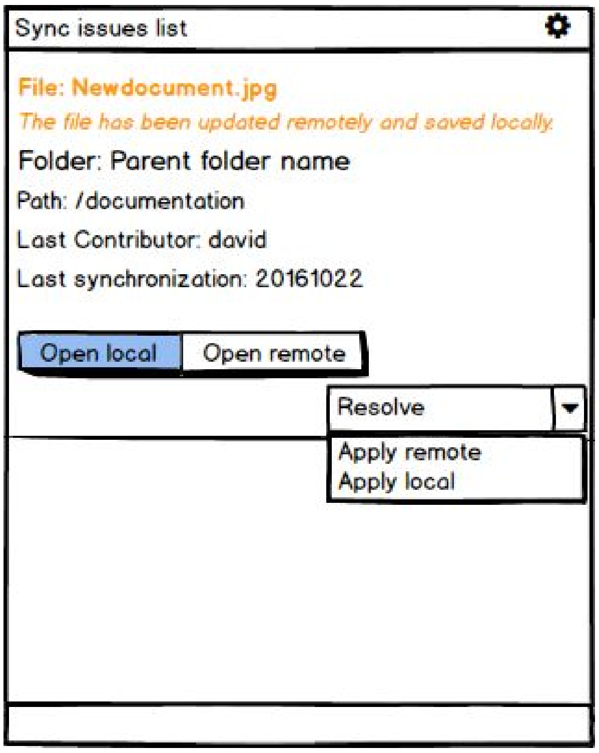
Last synchronization: 20161022

Resolve

Apply remote trash

Apply local rename and untrash the file

<u>For The Update and/or Save actions, add “Open Local” and “Open Remote” options</u>



Sync issues list

File: Newdocument.jpg

The file has been updated remotely and saved locally.

Folder: Parent folder name

Path: /documentation

Last Contributor: david

Last synchronization: 20161022

Roadmap:

- Remotely, add some information on the event log information of the document. Action could be “conflicts management after “X” action”.

- Add a bulk management of conflicts on the UI.

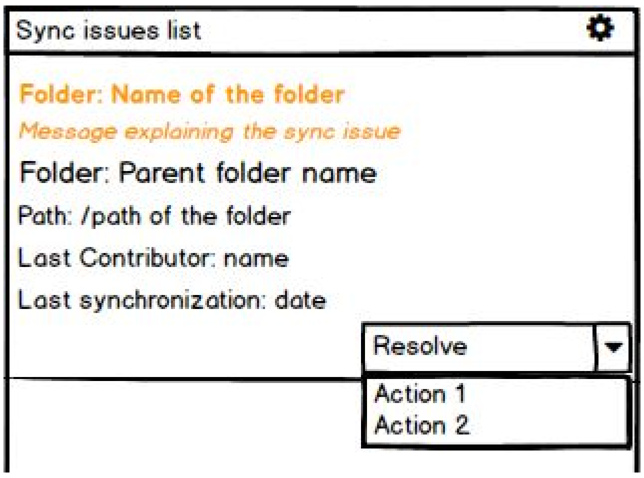
Concurrent actions on folders

		Folder actions				
		Creating	Moving	Trashing	Untrashing	Renaming
Folderish document actions	Creating	X	X	X	X	X
	Moving	X	No upload or download	Remote moved folder downloaded	X	Remote moved folder downloaded, local rename not uploaded
	Deleting	X	X	X	Changes remain both sides	X
	Trashing	X	Locally trashed folder	Locally trashed folder	X	Locally trashed folder
	Untrashing	X	X	X	Untrashed on both sides	X
	Updating title	X	Server rename not downloaded , moved local folder not uploaded	Local trashed folder remains, server rename not downloaded	X	No upload or download,
	Giving read permissions to the user	X	Moved folder remains	Local trashed folder remains	Untrashed local folder	Local rename remains
	Removing read permissions to the user	X	Local folder emty	Local folder emty	Local folder emty	Local folder emty
	Giving write permissions to the user	Issues for folders previously sync with Read Permissions: local changes remain, no upload even with write permissions granted.				
	Removing write permissions to the user	X	Local folder emty	Local folder emty	Local folder emty	Local folder emty

To be implemented

For all previously listed use cases where 2 actions are done, locally and remotely, a conflict should be raised.

For each conflict, some information will be displayed to the user through the name of the folder: an explicit message describing the conflict and actions to resolve it.



Sync issues list

Folder: Name of the folder

Message explaining the sync issue

Folder: Parent folder name

Path: /path of the folder

Last Contributor: name

Last synchronization: date

Message : "the folder has been X remotely and Y locally" where X and Y are described on the table.
X is the action server side and Y the action client side.
Following table details the options proposed to the user for resolving the conflict, depending on X/Y actions.

X / Y	Moved	Trashed	Untrashed	Renamed
Moved	Apply remote move / Apply local move	Apply remote move / Apply local trash	X	Apply remote move /
Deleted	X	X	Apply remote delete / Apply local untrash	X
Trashed	Apply remote trash / Apply local move and untrash remotely	X	X	Apply remote trash / Apply local rename and untrash remotely
Updated	Apply remote update / Apply local move	Apply remote update / Apply local trash	X	Apply remote update Apply local rename/
Give Read Permissions	*"Refers to constraint "Not possible to update the document without Write permission"*			
Remove Read permissions				

Remove Write permissions	
Give Write permissions	*See below*

“Give Write”: Message “You have been granted with write permissions on this folder and then you can apply your local changes”.

- Resolve:
  - “Apply local action”
  - “Cancel local action”

Constraint prevent action execution

On files

Tests / Current Results

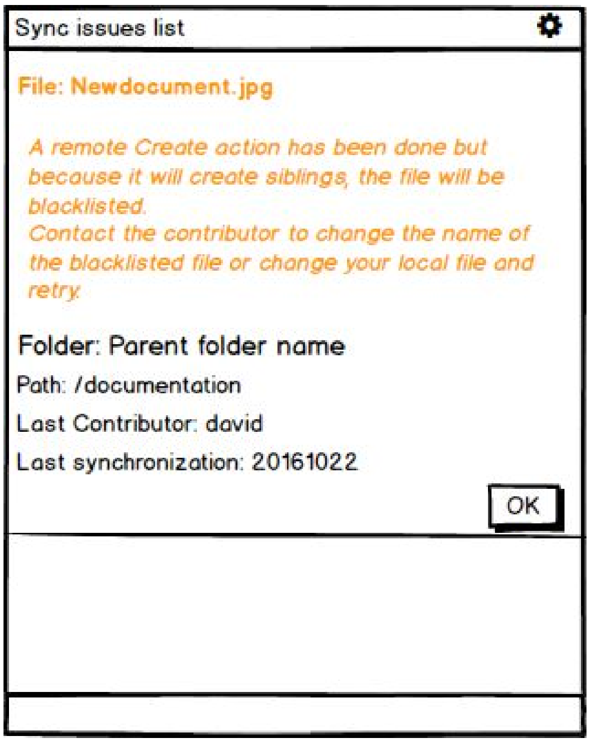
	Sibling with same name	File accessed by other process (locally edited and modified server side)
Creating	New picture is downloaded and labelled “__1”	X
Changing file	labelled “__x”	Local file is replaced
Moving	labelled “__x”	Locally moved and local changes saved.
Saving	labelled “__x”	If Direct edit uses the same application, local changes are uploaded
Trashing	X	File put in trash
Untrashing	labelled “__x”	X

To implement

- **Sibling with the same name**. We don’t want labelled “__X” files anymore.

For each listed use case, a conflict should be raised.

Message: “A remote X action has been done but because it will create siblings, the file will be blacklisted.
Contact the contributor to change the name of the blacklisted file or change your local file and retry.”
Where X = Create, Change file, Move, Save, Untrash.



Sync issues list

File: Newdocument.jpg

A remote Create action has been done but because it will create siblings, the file will be blacklisted.
Contact the contributor to change the name of the blacklisted file or change your local file and retry.

Folder: Parent folder name

Path: /documentation

Last Contributor: david

Last synchronization: 20161022

- **File accessed by other processes**

Message will be: “A remote X action has been done while your local file is being accessed.” Where X = Create, Change file, Move, Save, Trash.

Resolve ?

On leave document

Tests / Current Results

	Not possible to update the document without Write permissions	Document is locked
Creating	X	X
Changing the main file	No upload server side but possible to change the file locally without error.	Information message locally **“The file “action_add_group copy.png” is locked.”**
Moving	No upload server side but possible to move the file locally without error.	Locked file not moved but possible to move it locally. *(inconsistency)*
Removing the main file	No upload server side but possible to move the file locally	Locked file not trashed but locally trashed

	without error.	*(inconsistency)*
Trashing	Same use case as before.	Same use case as before.
Untrashing	X	Locked file remains trashed

To implement:

- **Update without write permissions**

This happen when the actions “**Give Read permissions**” or “**Remove Write permissions**” are occurring remotely.

Message “You have been lost your write permissions on this file. Your local change can’t be uploaded.”

Resolve options:

- Unsync and keep local changes (default)
- Unsync and remove the file
- Override the file with server version

For the remotely “**Remove Read**” action:

Message “You don’t have anymore the Read permissions on this file. Your action will be lost and the file trashed.”

Resolve options:

- Unsync and keep local changes (default)
- Unsync and remove the file

- **Document is locked**

Message “The file has been locked remotely by another user. Your local change can’t be uploaded.”

Resolve options:

- Unsync and keep local changes (default)
- Unsync and remove the file
- Override the file with server version

On folder

Tests / Current Results

	Sibling with same name	Child being accessed by other process
Creating	Inform user that remote folder with the same name exists.	X
Renaming	Same use case as before.	Folder is renamed locally.
Moving	Moved new folder is labelled with “__1”	Folder is moved locally.
Trashing	X	Locally put in trash
Untrashing	Conflict managed by the OS “replace” or “Cancel”	X
Deleting	X	X

To implement

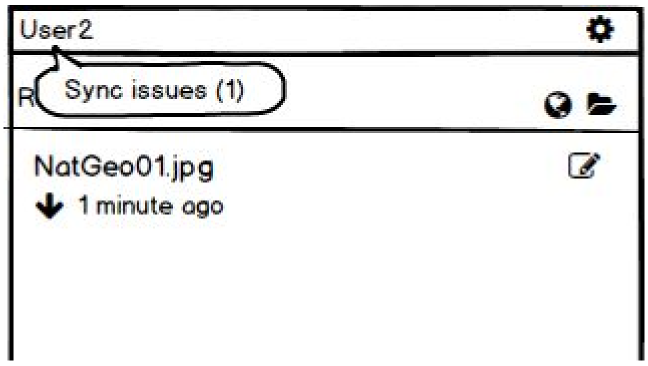
- **Actions creating siblings**

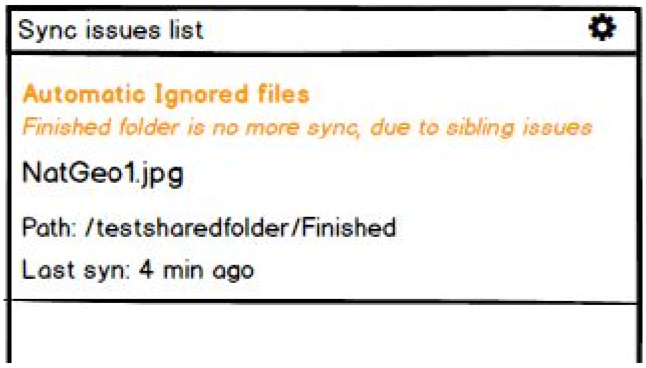
Different use cases should be addressed:

- ***1* New local folder AND Renaming server side create siblings**: No upload server side of the new local folder. Same title is authorized server side for now so client behaviour should be consistent.

2 scenarios depending of the local user

    - Connected User *User2* is the *creator* of the new local folder:
        - Sync error, folder is blacklisted and is no sync. But it remains locally.




Sync issues list

Automatic Ignored files

Finished folder is no more sync, due to sibling issues

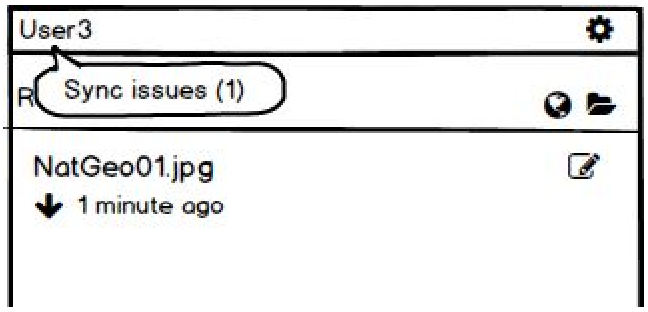
NatGeo1.jpg

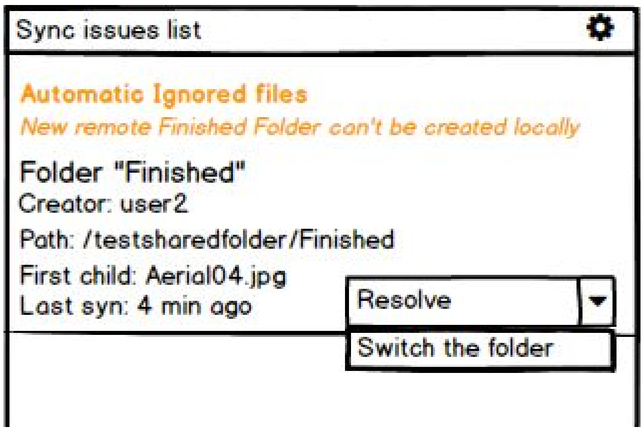
Path: /testsharedfolder/Finished

Last syn: 4 min ago

- Connected User User3 is *not the creator* of the new local folder and he is sync the remote parent folder
    - Renaming is done

      User3 will have the information that a new folder has been created (and by who) in his sync remote space, but because there is already a sibling folder synced locally, it can't be created (no sibling with same name constraint). Folder will be automatically blacklisted. When User3 browses the list of "Synchronisation issues", a new entry for that folder is displayed . The associated resolution screen proposes a link to the folder with the link to the new folder (or maybe display the first items of its content) and proposes to switch the folder to synchronise locally.




Sync issues list

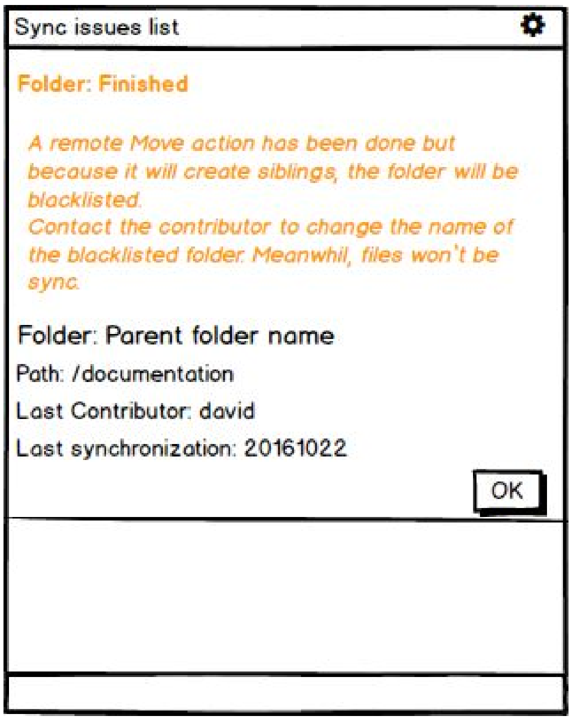
Automatic Ignored files

New remote Finished Folder can't be created locally

Folder "Finished"
Creator: user2
Path: /testsharedfolder/Finished
First child: Aerial04.jpg
Last syn: 4 min ago

- *2* **Remote action** creating siblings (create, rename, move, untrash) must not be uploaded as we can't have sibling folders locally.

Message: "A remote X action has been done but because it will create siblings, the folder will be blacklisted.
Contact the contributor to change the name of the blacklisted folder. Meanwhile, files won't be sync".
Where X = Create, Rename, Move, Untrash.


Sync issues list

Folder: Finished

A remote Move action has been done but because it will create siblings, the folder will be blacklisted.
Contact the contributor to change the name of the blacklisted folder. Meanwhil, files won't be sync.

Folder: Parent folder name
Path: /documentation
Last Contributor: david
Last synchronization: 20161022

On folderish document

Tests / Current Results

	Not possible to update the document without Write permissions
Creating	No changes server side.
Updating the title	No changes server side.
Moving	No changes server side.
Trashing	No changes server side.
Untrashing	No changes server side.
Deleting	No changes server side.
Giving Write permission to the user	X
Removing Write permission to the user	X
Giving Read permission to the user	X
Removing Read permission to the user	X

To Implement

- **Update without write permissions**

This happen when the actions “**Give Read permissions**” or “**Remove Write permissions**” are occurring remotely.

Message “You have been lost your write permissions on this folder. Your local change can’t be uploaded.”

Resolve options:

- Unsync and keep local changes (default)
- Unsync and remove the folder
- Override the folder with server version

For the remotely “**Remove Read**” action:

Message “You don’t have anymore the Read permissions on this folder. Your action will be lost and the folder trashed.”

Resolve options:

- Unsync and keep local changes (default)
- Unsync and remove the folder