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**emodpy**

**Institute for Disease Modeling**

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emodpy is a collection of Python scripts and utilities created to streamline user interactions with EMOD and idmtools. Additional functionality for interacting with EMOD is provided in the [emod\\_api](#) and [idmtools](#) packages.

See [Welcome to idmtools](#) for a diagram showing how idmtools and each of the related packages are used in an end-to-end workflow using EMOD as the disease transmission model.



## INSTALLATION

You can install emodpy in two different ways. If you intend to use emodpy as IDM builds it, follow the instructions in *Basic installation*. However, if you intend to modify the emodpy source code to add new functionality, follow the instructions in *Developer installation*. Whichever installation method you choose, the prerequisites are the same.

### 1.1 Prerequisites

- Windows 10 Pro or Enterprise
- Python 3.6 or 3.7 64-bit (<https://www.python.org/downloads/release>)

**Warning:** Do not install Python 3.8, which includes breaking changes.

- Python virtual environments

Python virtual environments enable you to isolate your Python environments from one another and give you the option to run multiple versions of Python on the same computer. When using a virtual environment, you can indicate the version of Python you want to use and the packages you want to install, which will remain separate from other Python environments. You may use `virtualenv`, which requires a separate installation, but `venv` is recommended and included with Python 3.3+.

#### 1.1.1 Basic installation

Follow the steps below if you will use `idmtools` to run and analyze simulations, but will not make source code changes.

1. Open a command prompt and create a virtual environment in any directory you choose. The command below names the environment “emodpy”, but you may use any desired name:

```
python -m venv emodpy
```

2. Activate the virtual environment:

- On Windows, enter the following:

```
emodpy\Scripts\activate
```

- On Linux, enter the following:

```
source emodpy/bin/activate
```

3. Install `idmtools` packages:

```
pip install emodpy --index-url=https://packages.idmod.org/api/pypi/pypi-  
→production/simple
```

If you are on Python 3.6, also run:

```
pip install dataclasses
```

4. Verify installation by pulling up idmttools help:

```
emodpy --help
```

5. When you are finished, deactivate the virtual environment by entering the following at a command prompt:

```
deactivate
```

## 1.1.2 Developer installation

Follow the steps below if you will make changes to the idmttools source code to add new functionality.

### Install idmttools

1. Install a Git client such as Git Bash or the Git GUI.
2. Open a command prompt and clone the idmttools GitHub repository to a local directory using the following command:

```
git clone https://github.com/InstituteForDiseaseModeling/emodpy-idmttools.git  
  
To work from the latest approved code, work from the "master" branch. To work from the latest code under active development, work from the "dev" branch.
```

3. Open a command prompt and create a virtual environment in any directory you choose. The command below names the environment “emodpy”, but you may use any desired name:

```
python -m venv emodpy
```

4. Activate the virtual environment:

- On Windows, enter the following:

```
emodpy\Scripts\activate
```

- On Linux, enter the following:

```
source emodpy/bin/activate
```

5. In the base directory of the cloned GitHub repository, run the setup script.

- On Windows, enter the following:

```
pip install py-make  
pymake setup-dev
```

- On Linux, enter the following:



```
make setup-dev
```

6. To verify that idmtools is installed, enter the following command:

```
emodpy --help
```

You should see a list of available cookie cutter projects and command-line options.

## Run tests

If you want to run tests on the code, do the following. You can add new tests to the GitHub repository and they will be run using the same commands. Note that COMPS access is generally restricted to IDM employees.

1. Login to COMPS by navigating to the idmtools root directory and entering the following at a command prompt:

```
python dev_scripts\create_auth_token_args.py --comps_url https://comps2.idmod.org_  
↪--username yourcomps_user --password yourcomps_password
```

2. If you are running the local platform with the nightly idmtools build, enter the following to log in to Docker:

```
docker login idm-docker-staging.packages.idmod.org
```

3. Navigate to the directory containing the code you want to test, such as the root directory or a subdirectory like emodpy\_platform\_comps, enter the following command:

```
pymake test-all
```



## CREATE SIMULATIONS



## CREATE INPUT FILES



**RUN SIMULATIONS**





## **CALIBRATE SIMULATIONS**



## PARAMETER SWEEPS AND MODEL ITERATION

### Contents

- *Parameter sweeps for model calibration*
- *Parameter sweeps and stochasticity*
- *How to do parameter sweeps*

### 6.1 Parameter sweeps for model calibration

(more info) For more information on model calibration, see *Calibrate simulations*.

### 6.2 Parameter sweeps and stochasticity

With a stochastic model (such as EMOD), it is especially important to utilize parameter sweeps, not only for calibration to data or parameter selection, but to fully explore the stochasticity in output. Single model runs may appear to provide good fits to data, but variation will arise and multiple runs are necessary to determine the appropriate range of parameter values necessary to achieve desired outcomes. Multiple iterations of a single set of parameter values should be run to determine trends in simulation output: a single simulation output could provide results that are due to random chance.

### 6.3 How to do parameter sweeps



## INTRODUCTION TO ANALYZERS



## OUTPUT REPORTS





**SERIALIZATION**



## 10.1 emodpy package

### 10.1.1 Subpackages

`emodpy.analyzers` package

Submodules

`emodpy.analyzers.adult_vectors_analyzer` module

**class** `emodpy.analyzers.adult_vectors_analyzer.AdultVectorsAnalyzer` (*name='hi'*)

Bases: `idmtools.entities.ianalyzer.IAnalyzer`

**initialize** ()

Call once after the analyzer has been added to the `AnalyzeManager`.

Add everything depending on the working directory or unique ID here instead of in `__init__`.

**map** (*data: Any, item: idmtools.core.interfaces.item.IItem*) → Any

In parallel for each simulation/work item, consume raw data from filenames and emit selected data.

**Parameters**

- **data** – A dictionary associating filename with content for simulation data.
- **item** – `IItem` object that the passed data is associated with.

**Returns** Selected data for the given simulation/work item.

**reduce** (*all\_data: dict*) → Any

Combine the `map()` data for a set of items into an aggregate result.

**Parameters** **all\_data** – A dictionary with entries for the item ID and selected data.

**emodpy.analyzers.population\_analyzer module**

```
class emodpy.analyzers.population_analyzer.PopulationAnalyzer (name='idm')
    Bases: idmtools.entities.ianalyzer.IAnalyzer

    initialize()
        Call once after the analyzer has been added to the AnalyzeManager.

        Add everything depending on the working directory or unique ID here instead of in __init__.

    map (data: Any, item: idmtools.core.interfaces.iitem.IItem) → Any
        In parallel for each simulation/work item, consume raw data from filenames and emit selected data.
```

**Parameters**

- **data** – A dictionary associating filename with content for simulation data.
- **item** – IItem object that the passed data is associated with.

**Returns** Selected data for the given simulation/work item.

```
reduce (all_data: dict) → Any
    Combine the map() data for a set of items into an aggregate result.
```

**Parameters** **all\_data** – A dictionary with entries for the item ID and selected data.

**emodpy.analyzers.timeseries\_analyzer module**

```
class emodpy.analyzers.timeseries_analyzer.TimeseriesAnalyzer (filenames=['output/InsetChart.json'],
                                                                chan-
                                                                nels=('Statistical
                                                                Population',
                                                                'Infectious
                                                                Population',
                                                                'Infected', 'Wan-
                                                                ing Population'),
                                                                save_output=True)

    Bases: idmtools.entities.ianalyzer.IAnalyzer

    data_group_names = ['group', 'sim_id', 'channel']
    ordered_levels = ['channel', 'group', 'sim_id']
    output_file = 'timeseries.csv'

    initialize()
        Call once after the analyzer has been added to the AnalyzeManager.

        Add everything depending on the working directory or unique ID here instead of in __init__.

    default_select_fn (ts)
    default_group_fn (k, v)
    default_plot_fn (df, ax)
    default_filter_fn (md)

    filter (simulation)
        Decide whether the analyzer should process a simulation/work item.

        Parameters item – An IItem to be considered for processing with this analyzer.
```

**Returns** A Boolean indicating whether simulation/work item should be analyzed by this analyzer.

**get\_channel\_data** (*data\_by\_channel*, *selected\_channels*)

**map** (*data*, *simulation*)

In parallel for each simulation/work item, consume raw data from filenames and emit selected data.

**Parameters**

- **data** – A dictionary associating filename with content for simulation data.
- **item** – `Item` object that the passed data is associated with.

**Returns** Selected data for the given simulation/work item.

**plot\_by\_channel** (*channels*, *plot\_fn*)

**reduce** (*all\_data*)

Combine the `map()` data for a set of items into an aggregate result.

**Parameters** **all\_data** – A dictionary with entries for the item ID and selected data.

## emodpy.defaults package

### Subpackages

#### emodpy.defaults.ep4 package

### Submodules

#### emodpy.defaults.ep4.dtk\_in\_process module

`emodpy.defaults.ep4.dtk_in_process.application` (*timestep*)

#### emodpy.defaults.ep4.dtk\_post\_process module

`emodpy.defaults.ep4.dtk_post_process.application` (*output\_path*)

#### emodpy.defaults.ep4.dtk\_pre\_process module

`emodpy.defaults.ep4.dtk_pre_process.convert_plugin_reports` (*config\_json*)

`emodpy.defaults.ep4.dtk_pre_process.application` (*json\_config\_path*)

## Submodules

### emodpy.defaults.emod\_sir module

```
class emodpy.defaults.emod_sir.EMODSir
    Bases: emodpy.defaults.iemod_default.IEMODDefault
    static config(erad_path) → Dict
    static campaign() → emodpy.emod_campaign.EMODCampaign
    static demographics() → Dict
```

### emodpy.defaults.iemod\_default module

```
class emodpy.defaults.iemod_default.IEMODDefault
    Bases: object
    config(erad_path) → Dict
    campaign() → Dict
    demographics() → Dict
    process_simulation(simulation)
```

## emodpy.generic package

### Submodules

#### emodpy.generic.serialization module

```
emodpy.generic.serialization.enable_serialization(task:
                                                    emodpy.emod_task.EMODTask,
                                                    use_absolute_times: bool = False)
    Enable serialization either by TIME or TIMESTEP based on use_absolute_times:param task: Task to enable
    :param use_absolute_times: When true, Serialization_Type will be set to TIME, otherwise it will be set to :param
    *TIMESTEP*:
```

Returns:

```
emodpy.generic.serialization.add_serialization_timesteps(task:
                                                            emodpy.emod_task.EMODTask,
                                                            timesteps: List[int],
                                                            end_at_final:
                                                            bool = False,
                                                            use_absolute_times:
                                                            bool = False)
```

Serialize the population of this simulation at specified time steps.

If the simulation is run on multiple cores, multiple files will be created.

#### Parameters

- **task** (*EMODTask*) – An EMODSimulation
- **timesteps** (*List[int]*) – Array of integers representing the time steps to use

- **end\_at\_final** (*bool*) – False means set the simulation duration such that the last serialized\_population file ends the simulation. NOTE- may not work if time step size is not 1
- **use\_absolute\_times** (*bool*) – False means the method will define simulation times instead of time steps see documentation on `Serialization_Type` for details

**Returns** None

```
emodpy.generic.serialization.load_serialized_population(task:
                                                         emodpy.emod_task.EMODTask,
                                                         population_path: str,
                                                         population_filenames:
                                                         List[str])
```

Sets simulation to load a serialized population from the filesystem

#### Parameters

- **task** (*EMODTask*) – An EMODSimulation
- **population\_path** (*str*) – relative path from the working directory to the location of the serialized population files.
- **population\_filenames** (*List[str]*) – names of files in question

**Returns** None

## emodpy.interventions package

### Submodules

#### emodpy.interventions.emod\_empty\_campaign module

```
class emodpy.interventions.emod_empty_campaign.EMODEmptyCampaign
    Bases: emodpy.defaults.iemod_default.IEMODDefault
    static campaign() → emodpy.emod_campaign.EMODCampaign
```

## emodpy.reporters package

### Submodules

#### emodpy.reporters.base module

```
class emodpy.reporters.base.BaseReporter
    Bases: object
    abstract to_dict()
    from_dict(data)
        Function allowing to initialize a Reporter instance with data. This function is called when reading a
        custom_reports.json file.
class emodpy.reporters.base.CustomReporter(name: str = None, Enabled: bool = True, Re-
                                           ports: list = <factory>, dll_file: str = None)
    Bases: emodpy.reporters.base.BaseReporter
```

This class represents a custom reporter. - name: Name that will be added to the custom\_reports.json file and should match the DLL's class name - Enabled: True/False to enable/disable the reporter - Reports: Default section present in the custom\_reports.json file allowing to configure the reporter - dll\_file: Filename of the dll containing the reporter. This file will be searched in the dll folder specified by the user on the *EMODTask.reporters*.

**name:** `str` = None

**Enabled:** `bool` = True

**Reports:** `list`

**dll\_file:** `str` = None

**to\_dict()** → Dict

Export the reporter to a dictionary. This function is called when serializing the reporter before writing the custom\_reports.json file.

**enable()**

**disable()**

**class** emodpy.reporters.base.**BuiltInReporter** (*class\_name: str* = None, *parameters: dict* = <factory>, *Enabled: bool* = True, *Pretty\_Format: bool* = True)

Bases: *emodpy.reporters.base.BaseReporter*

**class\_name:** `str` = None

**parameters:** `dict`

**Enabled:** `bool` = True

**Pretty\_Format:** `bool` = True

**to\_dict()**

**from\_dict(data)**

Function allowing to initialize a Reporter instance with data. This function is called when reading a custom\_reports.json file.

**class** emodpy.reporters.base.**Reporters** (*relative\_path='reporter\_plugins'*)

Bases: *emodpy.emod\_file.InputFilesList*

**add\_reporter** (*reporter*)

**property json**

**property empty**

**add\_dll** (*dll\_path: str*)

Add a dll file from a path

**Parameters** *dll\_path* – Path to file

Returns:

**add\_dll\_folder** (*dll\_folder: str*)

Add all the dll files from a folder

**Parameters** *dll\_folder* – Folder to add the dll file from

Returns:

**read\_custom\_reports\_file** (*custom\_reports\_path, extra\_classes=[]*) → NoReturn

Read from a custom reporter file



Parameters **custom\_reports\_path** – The custom reports file to add(single file).

**set\_task\_config** (*task: EMODTask*) → NoReturn  
Set task config

Parameters **task** – Task to configure

Returns:

**gather\_assets** (*\*\*kwargs*) → List[idmtools.assets.asset.Asset]  
Gather input files for Input File List

Returns:

## emodpy.reporters.builtin module

```
class emodpy.reporters.builtin.ReportNodeDemographics (class_name: str = 'ReportNodeDemographics',
parameters: dict = <factory>, Enabled: bool = True,
Pretty_Format: bool = True,
Stratify_By_Gender: bool = False, Age_Bins: list = <factory>)

Bases: emodpy.reporters.base.BuiltInReporter

Stratify_By_Gender: bool = False

Age_Bins: list

class_name: str = 'ReportNodeDemographics'

class emodpy.reporters.builtin.ReportHumanMigrationTracking (class_name: str =
None, parameters:
dict = <factory>,
Enabled: bool =
True, Pretty_Format:
bool = True)

Bases: emodpy.reporters.base.BuiltInReporter

config (config_builder, manifest)

parameters: dict
```

**emodpy.reporters.custom module**

```
class emodpy.reporters.custom.ReportAgeAtInfectionHistogramPlugin (name: str
                                                                    = 'Re-
portPlug-
inAgeAt-
Infection-
Histogram',
                                                                    Enabled:
                                                                    bool =
                                                                    True,
                                                                    Reports: list =
                                                                    <factory>,
                                                                    dll_file: str
                                                                    = 'libRe-
portAgeAt-
Infec-
tionHis-
togram_plugin.dll',
                                                                    age_bins:
                                                                    list =
                                                                    <factory>,
                                                                    inter-
val_years:
                                                                    int =
                                                                    <factory>)
```

Bases: *emodpy.reporters.base.CustomReporter*

**name:** *str* = 'ReportPluginAgeAtInfectionHistogram'

**dll\_file:** *str* = 'libReportAgeAtInfectionHistogram\_plugin.dll'

**Reports:** *list*

**age\_bins:** *list*

**interval\_years:** *int*

```
class emodpy.reporters.custom.ReportHumanMigrationTracking (name: str = 'Re-
portHumanMi-
grationTracking',
                                                                    Enabled:
                                                                    bool =
                                                                    True,
                                                                    Reports: list =
                                                                    <factory>,
                                                                    dll_file:
                                                                    str = 'libhumanmigra-
tiontracking.dll')
```

Bases: *emodpy.reporters.base.CustomReporter*

The human migration tracking report is a CSV-formatted report that provides details about human travel during simulations. The finished report will provide one line for each surviving individual that migrates during the simulation. There are no special parameters that need to be configured to generate the report.

**name:** *str* = 'ReportHumanMigrationTracking'

**dll\_file:** *str* = 'libhumanmigrationtracking.dll'

**Reports:** *list*

```
class emodpy.reporters.custom.ReportNodeDemographics (name: str = 'ReportNodeDemographics', Enabled: bool = True, Reports: list = <factory>, dll_file: str = 'libReportNodeDemographics.dll')
```

Bases: `emodpy.reporters.base.CustomReporter`

The node demographics report is a CSV-formatted report that provides population information stratified by node. For each time step, the report will collect data on each node and age bin.

**name:** `str = 'ReportNodeDemographics'`

**dll\_file:** `str = 'libReportNodeDemographics.dll'`

**configure\_report** (*age\_bins=None, ip\_key\_to\_collect="", stratify\_by\_gender=1*)

Creates the report and sets up the parameters.

#### Parameters

- **age\_bins** – The Age Bins (in years) to aggregate within and report; an empty array implies ‘do not stratify by age.’
- **ip\_key\_to\_collect** – The name of the IndividualProperty key to stratify by; an empty string implies ‘do not stratify by IP’
- **stratify\_by\_gender** – Set to true (1) to stratify by gender; a value of 0 will not stratify by gender.

**Returns** Nothing

```
class emodpy.reporters.custom.ReportEventCounter (name: str = 'ReportEventCounter', Enabled: bool = True, Reports: list = <factory>, dll_file: str = 'libreporteventcounter.dll')
```

Bases: `emodpy.reporters.base.CustomReporter`

The event counter report is a JSON-formatted file that keeps track of how many of each event types occurs during a time step. The report produced is similar to the InsetChart.json channel report, where there is one channel for each event defined in the configuration file (config.json).

**name:** `str = 'ReportEventCounter'`

**dll\_file:** `str = 'libreporteventcounter.dll'`

**configure\_report** (*duration\_days=10000, event\_trigger\_list=None, nodes=None, report\_description="", start\_day=0*)

Create the report and set up the parameters.

#### Parameters

- **duration\_days** – The duration of simulation days over which to report events.
- **event\_trigger\_list** – The list of event triggers for the events included in the report.
- **nodes** – The list of nodes in which to track the events, setting it to None or [] tracks all nodes.
- **report\_description** – Name of the report (it augments the filename of the report). If multiple CSV reports are being generated, this allows the user to distinguish one report from another.
- **start\_day** – The day to start collecting data for the report.

**Returns** Nothing

## 10.1.2 Submodules

### emodpy.bamboo module

`emodpy.bamboo.get_model_files(plan, manifest, scheduled_builds_only=True)`

### emodpy.bamboo\_api\_utils module

`emodpy.bamboo_api_utils.bamboo_connection()`

**class** `emodpy.bamboo_api_utils.BambooConnection`

Bases: `object`

Bamboo API config and basic functionality/connectivity wrapper.

Automatically probes the most likely endpoint locations (with and without https, with and without port numbers).

Important functions:

- `login`: logs into the bamboo api, caches the login token so you don't have to pass creds for every req. in a session
- `get_bamboo_api_url`: translate a relative API URL into a fully qualified URL
- `normalize_url`: detect whether a URL is relative or not, translate relative URLs to fully qualified ones
- `make_get_request`: makes a request to the specified API url, adds some convenient error and login handling
- `download_file`: downloads a file from the specified artifacts url to a location on disk

**property** `server`

`str`: Keeps track of a single instance of the server base url. (e.g. <http://idm-bamboo:8085>)

**property** `session_cookie`

`str`: Automatically load and instance the login session cookie jar.

**get\_server\_url** (`ssl: bool = True, useport: bool = False`) → `str`

Get a particular variant of the server url w/ or w/o ssl and port (e.g. `False/False` -> <http://idm-bamboo>)

**Parameters**

- **ssl** (`bool`) – whether to use ssl, default to using ssl
- **useport** (`bool`) – whether to use the port, default to not use port

**Returns** endpoint url

**Return type** `str`

**find\_server** () → `str`

Explore all possible server urls, return the first one found to exist.

**Returns** server url

**Return type** `str`

**url\_exists** (`url: str`) → `bool`

Try a simple get request given an endpoint url, return whether it was successful (code 200).

**Parameters** `url` (`str`) – url to issue a test request to

**Returns** whether or not a request to the url succeeds (w/ status 200)

**Return type** `bool`

**property session\_cookie\_filename**

File where bamboo session cookie is stored.

**Returns** fully qualified file path of session cookie file

**Return type** `str`

**load\_session\_cookie** () → `<module 'requests.cookies' from 'home/docs/checkouts/readthedocs.org/user_builds/institute-for-disease-modeling-emodpy/envs/v1.15.2/lib/python3.7/site-packages/requests/cookies.py'>`

Load api login session cookies from disk.

**Returns** session cookie jar

**Return type** `requests.cookies`

**write\_session\_cookie** (*cookies:* `<module 'requests.cookies' from 'home/docs/checkouts/readthedocs.org/user_builds/institute-for-disease-modeling-emodpy/envs/v1.15.2/lib/python3.7/site-packages/requests/cookies.py'>`)

Write post-login cookies for session to disk.

**get\_bamboo\_url** (*relative\_url: str*) → `str`

Add bamboo server, port, and protocol to bamboo url.

**Parameters** *relative\_url* (`str`) – relative url (artifact link or api url)

**Returns** fully qualified url

**Return type** `str`

**get\_bamboo\_api\_url** (*relative\_url: str, json: bool = False, params: dict = {}*) → `str`

Get fully qualified bamboo api url from a relative url w/ given json mode and appending all parameters.

**Parameters**

- **relative\_url** (`str`) – api url (e.g. project/<project-key>)
- **json** (`bool`) – whether to get results in json format (otherwise, default is xml)
- **params** (`dict`) – name/value dictionary of query parameters

**Returns** fully qualified url that a request can be issued against

**Return type** `str`

**save\_credentials** (*username: str, password: str*)

Save bamboo api login credentials using keyring.

**Parameters**

- **username** (`str`) – bamboo api login username (e.g. `somebody@idmod.org`)
- **password** (`str`) – bamboo api login password

**ensure\_logged\_in** ()

Check if a login session exists using saved cookies, if not login using keyring stored creds.

**login\_session\_exists** () → `bool`

Test whether an existing session cookie exists and an active login session exists.

**Returns** whether an active login session exists

**Return type** `bool`

**login** (*username: str = None, password=None*) → *bool*

Login to the bamboo api. If username or password are not provided, use stored credentials from keyring.

**Parameters**

- **username** (*str*) – bamboo api login username (e.g. *somebody@idmod.org*)
- **password** (*str*) – bamboo api login password

**Returns** success/failure

**Return type** *bool*

**normalize\_url** (*url: str*) → *str*

Determine whether a url is relative or fully qualified, translate relative urls to fully qualified versions.

**Parameters** **url** (*str*) – relative or fully qualified url

**Returns** fully qualified url

**Return type** *str*

**make\_get\_request** (*url: str, retries: int = 3*) → *requests.models.Response*

Make a get request against the bamboo server.

**Parameters** **url** (*str*) – relative or fully qualified url

**Returns** request object returned from *requests.get()*

**Return type** *requests.Response*

**make\_api\_get\_request** (*relative\_url: str, json: bool = False, params: dict = {}*) → *requests.models.Response*

Translate relative api url to the fully qualified bamboo api url, make a get request against it.

**Parameters**

- **relative\_url** (*str*) – url relative to the bamboo api endpoint (e.g. 'result/MYPROJ-MYPLAN/123') to make the request against
- **json** (*bool*) – whether to return results in json
- **params** (*dict*) – name/value dictionary of additional parameters to pass

**Returns** request object returned from *requests.get()*

**Return type** *requests.Response*

**download\_file** (*url: str, destination: str*) → *list*

Download a specific artifact file (from the full artifact url provided) to disk.

Streams the download to avoid common 'gotchas' with downloading via http.

**Parameters**

- **url** (*str*) – url to download
- **destination** (*str*) – destination path or filename where the artifact is to be downloaded to

**Returns** local filename of file that has been downloaded

**Return type** (*str*)

**class** *emodpy.bamboo\_api\_utils.BuildInfo*

Bases: *object*

A collection of methods for getting data on build results.

**classmethod** `build_passed(plan_key: str, build_num: int) → bool`

Determine whether a given build succeeded or not.

**Parameters**

- **plan\_key** (*str*) – bamboo plan key (including project key)
- **build\_num** (*int*) – build number to retrieve results for

**Returns** whether the build succeeded

**Return type** `bool`

**static** `successful_build_result(result) → bool`

Analyze a build result json object and determine if it corresponds to a successful build

**Parameters** **result** – json build result

**Returns** whether the build was successful

**Return type** `bool`

**static** `get_build_info(plan_key: str, index: int)`

Retrieve the build info in json format for a given build plan with a relative index (0=latest)

**Parameters**

- **plan\_key** (*str*) – bamboo plan key (including project key)
- **index** (*int*) – index of build to retrieve info for (0=latest, 1=2nd most recent, etc.)

**Returns** build info results json

**classmethod** `get_latest_successful_build(plan_key: str, scheduled_only: bool = True, max_iterations: int = 100)`

Find the latest successful build within the last max\_iterations builds for a given plan.

**Parameters**

- **plan\_key** (*str*) – bamboo plan key (including project key)
- **scheduled\_only** (*bool*) – only count automatically run scheduled or triggered builds as successful
- **max\_iterations** (*int*) – maximum number of older builds to look through

**Returns**

**tuple containing:** build\_num (*str*): build number of last successful build build\_info: json data structure of build info for that build

**Return type** (`tuple`)

**classmethod** `get_latest_build(plan_key: str)`

Get the build info for the most recently run build for a given plan.

**Parameters** **plan\_key** (*str*) – bamboo plan key (including project key)

**Returns**

**tuple containing:** build\_num (*str*): build number of last successful build build\_info: json data structure of build info for that build

**Return type** (`tuple`)

**class** `emodpy.bamboo_api_utils.BuildArtifacts`

Bases: `object`

A collection of methods for finding and interacting with build artifacts.

```
ERADICATION_EXE = 'Eradication.exe'
SCHEMA_JSON = 'schema.json'
REPORTER_PLUGINS = 'Reporter-Plugins'
```

```
classmethod find_artifacts_by_name(plan_key: str, build_num: int, artifact: str) → list
```

Find all urls for files of an artifact of a given name for a specific build.

**Parameters**

- **plan\_key** (*str*) – bamboo plan key (including project key)
- **build\_num** (*int*) – build number to retrieve artifact urls for
- **artifact** (*str*) – artifact name/id

**Returns** list of artifact urls that can be downloaded

**Return type** (*list of str*)

```
classmethod find_artifacts(plan_key: str, build_num: int, artifact_list: list) → list
```

Find all urls for files of a list of artifacts for a specific build.

**Parameters**

- **plan\_key** (*str*) – bamboo plan key (including project key)
- **build\_num** (*int*) – build number to retrieve artifact urls for
- **artifact\_list** (*list*) – list of artifact names/ids

**Returns** list of artifact urls that can be downloaded

**Return type** (*list of str*)

```
classmethod find_build_essential_artifacts(plan_key: str, build_num: int) → list
```

Find all ‘build essential’ artifact urls (Eradication, schema, reporters) for a specific build

**Parameters**

- **plan\_key** (*str*) – bamboo plan key (including project key)
- **build\_num** (*int*) – build number to retrieve artifact urls for

**Returns** list of artifact urls that can be downloaded

**Return type** (*list of str*)

```
classmethod find_all_artifacts(plan_key: str, build_num: int) → list
```

Find all artifact urls (Eradication, schema, reporters) for a specific build

**Parameters**

- **plan\_key** (*str*) – bamboo plan key (including project key)
- **build\_num** (*int*) – build number to retrieve artifact urls for

**Returns** list of artifact urls that can be downloaded

**Return type** (*list of str*)

```
classmethod find_all_artifact_names(plan_key: str, build_num: int) → list
```

Find all artifact names (e.g. ‘Eradication.exe’) for a specific build (can be plugged into find\_artifacts() to get actual urls that can be downloaded)

**Parameters**

- **plan\_key** (*str*) – bamboo plan key (including project key)



- **build\_num** (*int*) – build number to retrieve artifact urls for

**Returns** list of artifact names that can be downloaded

**Return type** (*list of str*)

**classmethod download\_artifact\_to\_file** (*plan\_key: str, build\_num: int, artifact, destination: str*) → *list*

Download files found for a named artifact to the filepath provided.

Additional files found will be downloaded as \_2, \_3, \_4, etc. For example, if there are 3 files for 'Eradication.exe' the first will be Eradication.exe, the second will be Eradication\_2.exe, the third Eradication\_3.exe.

**Parameters**

- **plan\_key** (*str*) – bamboo plan key (including project key)
- **build\_num** (*int*) – build number to retrieve artifact urls for
- **artifact** (*list or str*) – list (or string) of artifact names
- **destination** (*str*) – destination path or filename where the artifact is to be downloaded to

**Returns** list of local filenames of files that have been downloaded

**Return type** (*list of str*)

**classmethod download\_artifacts\_to\_path** (*plan\_key: str, build\_num: int, artifact, destination\_path: str*) → *list*

Download all the files for a given artifact and build to a specific folder, using their original filenames.

**Parameters**

- **plan\_key** (*str*) – bamboo plan key (including project key)
- **build\_num** (*int*) – build number to retrieve artifact urls for
- **artifact** (*list or str*) – list (or string) of artifact names
- **destination\_path** (*str*) – path to destination folder where files are to be downloaded

**Returns** list of local filenames of files that have been downloaded

**Return type** (*list of str*)

**classmethod download\_latest\_good\_Eradication\_exe** (*plan\_key: str, destination: str*) → *str*

Find the latest successful build for a specified plan, download the Eradication.exe artifact to a specified path.

**Parameters**

- **plan\_key** (*str*) – bamboo plan key (including project key)
- **destination** (*str*) – destination path or filename where the artifact is to be downloaded to

**Returns** build number of build that was found and had its artifact downloaded

**Return type** *str*

**classmethod download\_latest\_good\_schema\_json** (*plan\_key: str, destination: str*) → *str*

Find the latest successful build for a specified plan, download the schema.json artifact to a specified path.

**Parameters**

- **plan\_key** (*str*) – bamboo plan key (including project key)
- **destination** (*str*) – destination path or filename where the artifact is to be downloaded to

**Returns** build number of build that was found and had its artifact downloaded

**Return type** *str*

**classmethod** **download\_eradication\_exe** (*plan\_key: str, build\_num: str, destination: str*) → *str*  
Download Eradication.exe artifact from a specific build.

**Parameters**

- **plan\_key** (*str*) – bamboo plan key (including project key)
- **build\_num** (*str*) – build number to download from
- **destination** (*str*) – destination path or filename where the artifact is to be downloaded to

**classmethod** **make\_exe\_executable** (*file\_path: str*)  
On linux change the file permissions on a binary to make it executable

**Parameters** **file\_path** (*str*) – binary file to mark as executable

**classmethod** **download\_schema\_json** (*plan\_key: str, build\_num: str, destination: str*) → *str*  
Download schema.json artifact from a specific build.

**Parameters**

- **plan\_key** (*str*) – bamboo plan key (including project key)
- **build\_num** (*str*) – build number to download from
- **destination** (*str*) – destination path or filename where the artifact is to be downloaded to

**classmethod** **download\_from\_bamboo\_url** (*url: str, destination: str*)  
Download Eradication.exe/Eradication directly from bamboo url Assume you already done login

**Parameters**

- **url** –
- **destination** (*str*) – destination path or filename where the artifact is to be downloaded to

**Returns** local file path that have been downloaded

**Return type** *str*

**class** **emodpy.bamboo\_api\_utils.BuildPlans**  
Bases: *object*

Collection of methods for getting information on build plans.

**static** **export\_spec** (*plan\_key: str*) → *str*  
Export a specific build plan to java specs.

**Parameters** **plan\_key** (*str*) – bamboo plan key (including project key)

**Returns** full text of the .java file for the plan spec, if the plan was found (empty string if not)

**Return type** *str*

**static** `get_plans_for_project` (*project\_key: str*) → list

Return a list of all the build plans for every plan in the project.

**Parameters** `project_key` (*str*) – bamboo project key

**Returns** list of plan keys for each plan that was found in the project

**Return type** (list of *str*)

`emodpy.bamboo_api_utils.login` (*username=None, password=None*)

Pass through to BambooConnection.login()

`emodpy.bamboo_api_utils.save_credentials` (*username, password*)

Pass through to BambooConnection.save\_credentials()

## emodpy.collections\_utils module

`emodpy.collections_utils.cut_iterable_to` (*obj: Iterable, to: int*) → Tuple[Union[List, Mapping], int]

Cut an iterable to a certain length.

### Parameters

- **obj** – The iterable to cut.
- **to** – The number of elements to return.

**Returns** A list or dictionary (depending on the type of object) of elements and the remaining elements in the original list or dictionary.

`emodpy.collections_utils.deep_get` (*d, key, default: callable = None, getter: callable = None, sep: str = '.'*)

`emodpy.collections_utils.deep_set` (*d, key, value, default: callable = None, getter: callable = None, setter: callable = None, sep: str = '.'*)

`emodpy.collections_utils.deep_del` (*d: dict, key, getter: callable = None, deleter: callable = None, sep: str = '.'*)

## emodpy.emod\_campaign module

**class** `emodpy.emod_campaign.EMODCampaign` (*name='Campaign', events=None, use\_defaults=True, \*\*kwargs*)

Bases: `object`

Class representing an EMOD Campaign. It contains: - events: a list of events for the given campaign - name: campaign name - use\_defaults: EMOD flag to use defaults for unspecified parameters - extra\_parameters: parameters set by the user that will be added to the campaign JSON

### property json

Property to transform the object in JSON

**static** `load_from_file` (*filename: str*) → object

Load a campaign from a JSON file.

**Parameters** `filename` – Path to the campaign file

Returns: an initialized *EMODCampaign* instance

**static load\_from\_dict** (*data: Dict*) → *object*  
Create a campaign object from a dict. :param data: The dictionary containing the data  
Returns: an initialized *EMODCampaign* instance

**clear** () → *NoReturn*  
Clear all campaign events

**get\_events\_at** (*timestep: int*) → *List[Dict]*  
Get a list of events happening at the specified timestep. Does not take into account recurrence and only consider start timestep. :param timestep: selected timestep  
Returns: list of events

**get\_events\_with\_name** (*name: str*) → *List[Dict]*  
Get a list of events with the given name. This search is based on the *Event\_Name* key of events. :param name: Name of the events  
Returns: list of events

**add\_event** (*event: Dict*) → *NoReturn*  
Add the given event to the campaign event. :param event: The event to add

**add\_events** (*events: List[Dict]*) → *NoReturn*  
Add a list of events to the campaign events. :param events: List of events to add

## emodpy.emod\_file module

**class** emodpy.emod\_file.**InputFilesList** (*relative\_path=None*)  
Bases: *idmtools.assets.asset\_collection.AssetCollection*

**abstract set\_task\_config** (*simulation*)

**gather\_assets** () → *List[idmtools.assets.asset.Asset]*  
Gather input files for Input File List  
Returns:

**class** emodpy.emod\_file.**MigrationTypes** (*value*)  
Bases: *enum.Enum*  
An enumeration.

**LOCAL** = 'Local'  
**AIR** = 'Air'  
**FAMILY** = 'Family'  
**REGIONAL** = 'Regional'  
**SEA** = 'Sea'

**class** emodpy.emod\_file.**MigrationModel** (*value*)  
Bases: *enum.Enum*  
An enumeration.

**NO\_MIGRATION** = 'NO\_MIGRATION'  
**FIXED\_RATE\_MIGRATION** = 'FIXED\_RATE\_MIGRATION'

---

```

class emodpy.emod_file.MigrationPattern(value)
    Bases: enum.Enum

    An enumeration.

    RANDOM_WALK_DIFFUSION = 'RANDOM_WALK_DIFFUSION'
    SINGLE_ROUND_TRIPS = 'SINGLE_ROUND_TRIPS'
    WAYPOINTS_HOME = 'WAYPOINTS_HOME'

class emodpy.emod_file.MigrationFiles(relative_path=None)
    Bases: emodpy.emod_file.InputFilesList

    enable_migration()
        Enables migration and sets the pattern if defined. If there are not other other parameters, it also set Enable_Migration_Heterogeneity to 0

    update_migration_pattern(migration_pattern: emodpy.emod_file.MigrationPattern,
                             **kwargs) → NoReturn
        Update migration pattern

        Parameters
            • migration_pattern – Migration Pattern to use
            • **kwargs –

        Returns NoReturn

    add_migration_from_file(migration_type: emodpy.emod_file.MigrationTypes, file_path: str,
                             multiplier: float = 1)
        Add migration info from a file

        Parameters
            • migration_type – Type of migration
            • file_path – Path to file
            • multiplier – Multiplier

        Returns:

    set_task_config(task: EMODTask)
        Update the task with the migration configuration

        Parameters task – Task to update

        Returns:

    gather_assets()
        Gather assets for Migration files. Called by EMODTask Returns:

    set_all_persisted()
        Set all migration assets as persisted

        Returns:

    merge_with(mf: emodpy.emod_file.MigrationFiles, left_precedence: bool = True) → NoReturn
        Merge migration file with other Migration file

        Parameters
            • mf – Other migration file to merge with
            • left_precedence – Does the current object have precedence or the other object?

```

Returns:

**read\_config\_file** (*config\_path*, *asset\_path*)

Try to recreate the migration based on a given config file and an asset path :param config\_path: path to the config :param asset\_path: path containing the assets

**class** emodpy.emod\_file.DemographicsFiles (*relative\_path=None*)

Bases: *emodpy.emod\_file.InputFilesList*

**set\_task\_config** (*task: EMODTask*, *extend: bool = False*)

Set the simulation level config. If extend is true, the demographics files are appended to the list :param task: :param extend:

Returns:

**add\_demographics\_from\_file** (*absolute\_path: str*, *filename: Optional[str] = None*)

Add demographics from a file

#### Parameters

- **absolute\_path** – Path to file
- **filename** – Optional filename. If not provided, the file name of source file will be used

Returns:

**add\_demographics\_from\_dict** (*content: Dict*, *filename: str*)

Add demographics from a dictionary object

#### Parameters

- **content** – Dictionary Content
- **filename** – Filename to call demographics file

Returns:

**class** emodpy.emod\_file.ClimateFileType (*value*)

Bases: *enum.Enum*

An enumeration.

**AIR\_TEMPERATURE** = 'Air\_Temperature'

**LAND\_TEMPERATURE** = 'Land\_Temperature'

**RELATIVE\_HUMIDITY** = 'Relative\_Humidity'

**RAINFALL** = 'Rainfall'

**class** emodpy.emod\_file.ClimateModel (*value*)

Bases: *enum.Enum*

An enumeration.

**CLIMATE\_OFF** = 'CLIMATE\_OFF'

**CLIMATE\_CONSTANT** = 'CLIMATE\_CONSTANT'

**CLIMATE\_KOPPEN** = 'CLIMATE\_KOPPEN'

**CLIMATE\_BY\_DATA** = 'CLIMATE\_BY\_DATA'

**class** emodpy.emod\_file.ClimateFiles

Bases: *emodpy.emod\_file.InputFilesList*

**set\_task\_config** (*task: EMODTask*)

Set the task Config. Set all the correct files for the climate.

**Parameters task** – Task to config

**add\_climate\_files** (*file\_type, file\_path*)

**gather\_assets** ()

Gather assets for Climate files. Called by EMODTask

**set\_climate\_constant** (*Base\_Air\_Temperature, Base\_Rainfall, Base\_Land\_Temperature=None, Base\_Relative\_Humidity=None*)

**read\_config\_file** (*config\_path, asset\_path*)

Try to recreate the climate based on a given config file and an asset path :param config\_path: path to the config :param asset\_path: path containing the assets

## emodpy.emod\_task module

emodpy.emod\_task.logger = <Logger emodpy.emod\_task (DEBUG)>

Note that these 3 functions could be member functions of EMODTask but Python modules are already pretty good at being 'static classes'.

emodpy.emod\_task.add\_ep4\_from\_path (task, ep4\_path)

emodpy.emod\_task.default\_ep4\_fn (task)

```
class emodpy.emod_task.EMODTask (command: Union[str, idm-
tools.entities.command_line.CommandLine] =
<property object>, platform_requirements:
Set[idmtools.entities.platform_requirements.PlatformRequirements]
= <factory>, _ITask__pre_creation_hooks:
List[Callable[[Union[Simulation, IWorkflowItem], IPlatform],
NoReturn]] = <factory>, _ITask__post_creation_hooks:
List[Callable[[Union[Simulation, IWorkflowItem], IPlatform],
NoReturn]] = <factory>, common_assets:
idmtools.assets.asset_collection.AssetCollection
= <factory>, transient_assets: idm-
tools.assets.asset_collection.AssetCollection = <fac-
tory>, eradication_path: str = None, demographics:
emodpy.emod_file.DemographicsFiles = <factory>, mi-
grations: emodpy.emod_file.MigrationFiles = <factory>,
reporters: emodpy.reporters.base.Reporters = <factory>,
climate: emodpy.emod_file.ClimateFiles = <factory>, config:
dict = <factory>, config_file_name: str = 'config.json',
campaign: emodpy.emod_campaign.EMODCampaign
= <factory>, simulation_demographics:
emodpy.emod_file.DemographicsFiles = <factory>, sim-
ulation_migrations: emodpy.emod_file.MigrationFiles =
<factory>, use_embedded_python: bool = True, is_linux: bool
= False, implicit_configs: list = <factory>, use_singularity:
bool = False, sif_filename: str = None)
```

Bases: idmtools.entities.itask.ITask

EMODTask allows easy running and configuration of EMOD Experiments and Simulations

**eradication\_path:** str = None

Eradication path. Can also be set through config file

**demographics:** emodpy.emod\_file.DemographicsFiles

Common Demographics

```
migrations: emodpy.emod_file.MigrationFiles
    Common Migrations

reporters: emodpy.reporters.base.Reporters
    Common Reports

climate: emodpy.emod_file.ClimateFiles
    Common Climate

config: dict
    Represents config.json

config_file_name: str = 'config.json'

campaign: emodpy.emod_campaign.EMODCampaign
    Campaign configuration

simulation_demographics: emodpy.emod_file.DemographicsFiles
    Simulation level demographics such as overlays

simulation_migrations: emodpy.emod_file.MigrationFiles
    Simulation level migrations

use_embedded_python: bool = True
    Add -python-script-path to command line

is_linux: bool = False

implicit_configs: list

use_singularity: bool = False

sif_filename: str = None

create_campaign_from_callback (builder, params=None)

create_demog_from_callback (builder, from_sweep=False, params=None)

classmethod from_default2 (eradication_path, schema_path, param_custom_cb=None,
                           config_path='new_config.json', campaign_builder=None,
                           ep4_custom_cb=<function default_ep4_fn>, demog_builder=None,
                           plugin_report=None, serial_pop_files=None,
                           **kwargs) → emodpy.emod_task.EMODTask

    Create a task from emod-api Defaults
```

#### Parameters

- **config\_path** – /path/to/new\_config.json
- **eradication\_path** – Path to Eradication binary
- **param\_custom\_cb** – Function that sets parameters for config
- **ep4\_custom\_cb** – Function that sets EP4 assets
- **plugin\_report** – Custom reports file

#### Returns

EMODTask

```
classmethod from_files (eradication_path=None, config_path=None, campaign_path=None,
                        demographics_paths=None, ep4_path=None, custom_reports_path=None,
                        asset_path=None, **kwargs)

    Load custom EMOD files when creating EMODTask.
```

#### Parameters



- **asset\_path** – If an asset path is passed, the climate, dlls, and migrations will be searched there
- **eradication\_path** – The eradication.exe path.
- **config\_path** – The custom configuration file.
- **campaign\_path** – The custom campaign file.
- **demographics\_paths** – The custom demographics files (single file or a list).
- **custom\_reports\_path** – Custom reports file

Returns: An initialized experiment

**load\_files** (*config\_path=None, campaign\_path=None, custom\_reports\_path=None, demographics\_paths=None, asset\_path=None*) → NoReturn  
Load files in the experiment/base\_simulation.

#### Parameters

- **asset\_path** – Path to find assets
- **config\_path** – Configuration file path
- **campaign\_path** – Campaign file path
- **demographics\_paths** – Demographics file path
- **custom\_reports\_path** – Path for the custom reports file

**pre\_creation** (*parent: Union[idmtools.entities.simulation.Simulation, tools.entities.iworkflow\_item.IWorkflowItem], platform: tools.entities.iplatform.IPlatform*) *idm-  
idm-*

Call before a task is executed. This ensures our configuration is properly done

**set\_command\_line** () → NoReturn  
Build and set the command line object.

Returns:

**set\_sif** (*path\_to\_sif*) → NoReturn  
Set the Singularity Image File.

Returns:

**gather\_common\_assets** () → `idmtools.assets.asset_collection.AssetCollection`  
Gather Experiment Level Assets Returns:

**gather\_transient\_assets** () → `idmtools.assets.asset_collection.AssetCollection`  
Gather assets that are per simulation Returns:

**copy\_simulation** (*base\_simulation: idmtools.entities.simulation.Simulation*) → `idm-  
tools.entities.simulation.Simulation`  
Called when making copies of a simulation.

Here we deep copy parts of the simulation to ensure we don't accidentally update objects :param  
base\_simulation: Base Simulation

Returns:

**set\_parameter** (*name: str, value: any*) → dict  
Set a value in the EMOD config.json file. This will be deprecated in the future in favour of  
emod\_api.config.

#### Parameters

- **name** – Name of parameter to set

- **value** – Value to set

**Returns** Tags to set

**static set\_parameter\_sweep\_callback** (*simulation: [idmtools.entities.simulation.Simulation](#), param: [str](#), value: Any*) → Dict[str, Any]

Convenience callback for sweeps

**Parameters**

- **simulation** – Simulation we are updating
- **param** – Parameter
- **value** – Value

**Returns** Tags to set on simulation

**classmethod set\_parameter\_partial** (*parameter: [str](#)*)

Convenience callback for sweeps

**Parameters** **parameter** – Parameter to set

**Returns:**

**get\_parameter** (*name: [str](#), default: Optional[Any] = None*)

Get a parameter in the simulation.

**Parameters**

- **name** – The name of the parameter.
- **default** – Optional, the default value.

**Returns** The value of the parameter.

**update\_parameters** (*params*)

Bulk update the configuration parameter values. This will be deprecated in the future in favour of `emod_api.config`.

**Parameters** **params** – A dictionary with new values.

**Returns** None

**reload\_from\_simulation** (*simulation: [idmtools.entities.simulation.Simulation](#)*)

Optional hook that is called when loading simulations from a platform.

**class** `emodpy.emod_task.EMODTaskSpecification`

Bases: `idmtools.registry.task\_specification.TaskSpecification`

**get** (*configuration: dict*) → `emodpy.emod\_task.EMODTask`

Return an EMODTask object using provided configuration :param configuration: Configuration for Task

**Returns** EMODTask for configuration

**get\_description** () → `str`

Defines a description of the plugin

**Returns** Plugin description

**get\_example\_urls** () → List[`str`]

Return a list of examples. This is used by the examples cli command to allow users to quickly load examples locally

**Returns** List of urls to examples

**get\_type()** → Type[emodpy.emod\_task.EMODTask]

Returns the Task type defined by specification

Returns:

**get\_version()** → str

Return the version string for EMODTask. This should be the module version so return that

**Returns** Version

## emodpy.utils module

**class** emodpy.utils.EradicationPlatformExtension (value)

Bases: enum.Enum

An enumeration.

**LINUX** = ''

**Windows** = '.exe'

**class** emodpy.utils.EradicationBambooBuilds (value)

Bases: enum.Enum

An enumeration.

**GENERIC\_LINUX** = 'DTKGENCI-SCONSLNXGEN'

**GENERIC\_WIN** = 'DTKGENCI-SCONSWINGEN'

**GENERIC** = 'DTKGENCI-SCONSLNXGEN'

**TBHIV\_LINUX** = 'DTKTBHIVCI-SCONSRELLNXTBHIV'

**TBHIV\_WIN** = 'DTKTBHIVCI-SCONSWINTBHIV'

**TBHIV** = 'DTKTBHIVCI-SCONSRELLNXTBHIV'

**MALARIA\_LINUX** = 'DTKMALCI-SCONSLNXMAL'

**MALARIA\_WIN** = 'DTKMALCI-SCONSWINMAL'

**MALARIA** = 'DTKMALCI-SCONSLNXMAL'

**HIV\_LINUX** = 'DTKHIVCI-SCONSRELLNXHIV'

**HIV\_WIN** = 'DTKHIVCI-RELWINHIV'

**HIV** = 'DTKHIVCI-SCONSRELLNXHIV'

**DENGUE\_LINUX** = 'DTKDENGCI-SCONSRELLNX'

**DENGUE\_WIN** = 'DTKDENGCI-VSRELWINALL'

**DENGUE** = 'DTKDENGCI-SCONSRELLNX'

**FP\_LINUX** = 'DTKFPCI-SCONSRELLNX'

**FP\_WIN** = 'DTKFPCI-SCONSWINFP'

**FP** = 'DTKFPCI-SCONSRELLNX'

**TYPHOID\_LINUX** = 'DTKTYPHCI-SCONSRELLNX'

**TYPHOID\_WIN** = 'DTKTYPHCI-SCONSWINENV'

**TYPHOID** = 'DTKTYPHCI-SCONSRELLNX'

```
EMOD_RELEASE = 'EMODREL-SCONSRELLNX'
```

```
RELEASE = 'DTKREL-SCONSRELLNX'
```

```
class emodpy.utils.BambooArtifact(value)
```

```
    Bases: enum.Flag
```

An enumeration.

```
ERADICATION = 1
```

```
SCHEMA = 2
```

```
PLUGINS = 4
```

```
ALL = 7
```

```
emodpy.utils.get_github_eradication_url(version: str, extension:
                                         emodpy.utils.EradicationPlatformExtension =
                                         <EradicationPlatformExtension.LINUX: ">) →
                                         str
```

Get the github eradication url for specified release

#### Parameters

- **version** – Release to fetch
- **extension** – Optional extensions. Defaults to Linux(None)

**Returns** Url of eradication release

```
emodpy.utils.save_bamboo_credentials(username, password)
```

Save bamboo api login credentials using keyring.

#### Parameters

- **username** (*str*) – bamboo api login username (e.g. `somebody@idmod.org`)
- **password** (*str*) – bamboo api login password

```
emodpy.utils.bamboo_api_login()
```

Automatically login to bamboo, prompt for credentials if none are cached or there's no login session.

```
emodpy.utils.download_bamboo_artifacts(plan_key: str, build_num: str = None, sched-
                                         uled_builds_only: bool = True, artifact:
                                         emodpy.utils.BambooArtifact = <BambooArti-
                                         fact.ERADICATION: 1>, out_path: str = None) →
                                         list
```

Downloads artifact(s) for a DTK Bamboo build plan to the specified path

#### Parameters

- **plan\_key** (*str*) –
- **build\_num** (*str*) –
- **scheduled\_builds\_only** (*bool*) –
- **artifact** (*BambooArtifact*) –
- **out\_path** (*str*) – Output path to save file (default to current directory)

**Returns** Returns list of downloaded files on filesystem

`emodpy.utils.download_latest_bamboo` (*plan*: `emodpy.utils.EradicationBambooBuilds`, *scheduled\_builds\_only*: `bool = True`, *out\_path*: `str = None`)  
→ `str`

Downloads the Eradication binary for the latest successful build for a Bamboo Plan to specified path. Exists for backward compatibility, just a pass-thru to `download_latest_eradication()`.

**Parameters**

- **plan** – Bamboo Plan key. for supported build
- **out\_path** – Output path to save file (default to current directory)

**Returns** Returns local filename of downloaded file

`emodpy.utils.download_latest_eradication` (*plan*: `emodpy.utils.EradicationBambooBuilds`, *scheduled\_builds\_only*: `bool = True`, *out\_path*: `str = None`) → `str`

Downloads the Eradication binary for the latest successful build for a Bamboo Plan to specified path.

**Parameters**

- **plan** – Bamboo Plan key. for supported build
- **out\_path** – Output path to save file (default to current directory)

**Returns** Returns local filename of downloaded file

`emodpy.utils.download_latest_reporters` (*plan*: `emodpy.utils.EradicationBambooBuilds`, *scheduled\_builds\_only*: `bool = True`, *out\_path*: `str = None`) → `list`

Downloads the reporter plugins for the latest successful build for a Bamboo Plan to specified path.

**Parameters**

- **plan** – Bamboo Plan key. for supported build
- **out\_path** – Output path to save file (default to current directory)

**Returns** Returns list of local filenames of downloaded files

`emodpy.utils.download_latest_schema` (*plan*: `emodpy.utils.EradicationBambooBuilds`, *scheduled\_builds\_only*: `bool = True`, *out\_path*: `str = None`)  
→ `str`

Downloads the schema.json for the latest successful build for a Bamboo Plan to specified path.

**Parameters**

- **plan** – Bamboo Plan key. for supported build
- **out\_path** – Output path to save file (default to current directory)

**Returns** Returns local filename of downloaded file

`emodpy.utils.download_from_url` (*url*, *out\_path*: `str = None`) → `str`

`emodpy.utils.download_eradication` (*url*: `str`, *cache\_path*: `str = None`, *spinner*=`None`)

Downloads Eradication binary

Useful for downloading binaries from Bamboo or Github

**Parameters**

- **url** – Url to binary
- **cache\_path** – Optional output directory
- **spinner** – Spinner object

**Returns** Full path to output file



## FREQUENTLY ASKED QUESTIONS

As you get started with emodpy, you may have questions. The most common questions are answered below. For questions related to functionality in related packages, see [Frequently asked questions](#) for idmtools and [Frequently asked questions](#) for emod-api. If you are using a disease-specific emodpy package, see the FAQs from that package for additional guidance.

**Why does emodpy download a new Eradication binary each time I run?** emodpy is designed to work much like a web browser: when you go to a website, the browser downloads html, png, and other files. If you visit the page again, it downloads them again so you always have the most current files. We want emodpy to work in much the same way. When you run simulations, emodpy will download the latest tested binary, schema, and supporting files that from the relevant EMOD ongoing branch.

However, if you need the stability of working from an older version, you can pass a Bamboo build number to `emodpy.bamboo.get_model_files()` to download that build instead. If you want to manually add a binary and corresponding schema in the downloads directory to use, comment out the call to `emodpy.bamboo.get_model_files()` and nothing new will be downloaded.

**What is the purpose of manifest.py?** The manifest.py file contains *all* of your input and output paths in a single location. It also includes the path where model binaries (and associated schema) are downloaded to and uploaded from. Although you may ignore these files, it can be helpful to reference the schema for parameter information and have access to the binary itself.

**I want to load a demographics.json file, not create one programmatically.** Okay, but be aware that one of the benefits of emodpy and emod-api is that you get guaranteed consistency between demographics and configuration parameters to meet all interdependencies. However, if you want to use a raw demographics.json that you are very confident in, you can open that in your demographics builder. For example:

```
def build_demog():
    import emod_api.demographics.Demographics as Demographics
    demog = Demographics.from_file( "demographics.json" )
    return demog
```

**What happens if I don't connect to the VPN?** You must be connected to the IDM VPN to access Bamboo and download the Eradication binaries (including plug-ins and schema). As an alternative, comment out the call to `emodpy.bamboo.get_model_files()` in the code and run the following (where “emod-disease” can be “emodpy-hiv”, “emodpy-malaria”, or “emod-measles”:

```
pip install emod-disease --upgrade
python -m emod-disease.bootstrap
```

The model files will be in a subdirectory called “stash.”

**Why are the example.py scripts read from the bottom?** A Python script's “main” block, which is also the entry point to the run script, appears at the end so that all the functions in the script have been parsed and are available. It is a common convention to structure the call flow bottom-up because of that.

**My simulation failed on COMPS but I didn't get an error until then** The OS of the requested Bamboo build plan and the OS of the target platform need to match. For example, if your target platform is Calculon, the default, you'll have to request a Linux build from Bamboo. There are no protections at this time (nor planned) to catch such misconfigurations.



## GLOSSARY

The following terms describe both the features and functionality of the emodpy software, as well as information relevant to using emodpy.

**asset collection** The set of specific input files (such as input parameters, weather or migration data, or other configuration settings) required for running a simulation.

**assets** See asset collection.

**builder** TBD

**experiment** A collection of multiple simulations, typically sent to an HPC.

**high-performance computing (HPC)** The use of parallel processing for running advanced applications efficiently, reliably, and quickly.

**task** TBD

**template** TBD



## CHANGELOG

### 13.1 1.1.0

#### 13.1.1 Additional Changes

- #0001 - Fix emod tests
- #0024 - Support of Kurt's workflows in idmtools
- #0070 - Custom\_reporters.json does not get automatically added?

#### 13.1.2 Bugs

- #0011 - task with simulation level demographics not work
- #0012 - How to add custom simulation tags from task?
- #0040 - examples- emod\_model- serialization- 03\_parameter\_reload getting wrong campaign
- #0042 - We should make EMODSir default work with eradication
- #0043 - Wired campaign format error
- #0044 - Examples- create\_sims\_pre\_and\_post\_process.py should import config\_update\_parameters correctly
- #0055 - Creation of campaign.json will fail in AC in COMPS - cannot overwrite AC files
- #0059 - EmodTask.pre\_post\_process should be renamed
- #0069 - Fix create\_serialized\_sims\_reload and create\_sims\_from\_default\_run\_analyzer examples
- #0072 - custom\_reports.json - not all of them have "enabled", but code assumes they do
- #0073 - Climate\_Model should be set to whatever it is set in config.json when from\_files is used.
- #0075 - custom\_reports: when reading my ReportNodeDemographics report, one of the parameters is not read in

### 13.1.3 Developer/Test

- #0015 - Add changelog script
- #0039 - Rename repo to emodpy

### 13.1.4 Documentation

- #0007 - Automate docs
- #0008 - Document a simple example of running DTK in idmtools
- #0045 - examples- emod\_model- post\_process\_command\_task- needs some mortality
- #0061 - make docs failed

### 13.1.5 Feature Request

- #0028 - We should implement reload\_from\_simulation() for EMODTask
- #0030 - Support of a list of campaign events
- #0032 - Utility function to create a campaign event
- #0033 - Support of reporters for EMOD
- #0034 - Support of schema defaults
- #0063 - Support of climate files

### 13.1.6 Models

- #0014 - Need to add --python-script-path option to EMODTask arguments
- #0029 - Modifications of base config parameters

### 13.1.7 Platforms

- #0021 - SSMT Build as part of GithubActions

### 13.1.8 User Experience

- #0037 - Add examples url to plugins specifications and then each plugin if they have examples
- #0049 - Add system tags for EMODTask

## 13.2 1.2.0

### 13.2.1 Additional Changes

- #0091 - Eradication.exe can't consume emodpy\_covid installed in a virtual environment (Windows)

### 13.2.2 Bugs

- #0054 - examplescreate\_sims\_eradication\_from\_github\_url.py failed
- #0098 - Few migration bugs

### 13.2.3 Documentation

- #0060 - Help with repro: dtk\_pre\_process executed twice before simulation attempted

### 13.2.4 Feature Request

- #0036 - Creation of migration file from code
- #0090 - We should have utils to download Eradication by giving url

### 13.2.5 User Experience

- #0047 - Directly use Eradication.exe from bamboo url seems not working
- #0068 - emodpyutils.py needs more robust solution for getting Eradication.exe paths



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