

Agile Workflows for Climate Impact Risk Assessment based on the ci:grasp Platform and the jABC Modeling Framework

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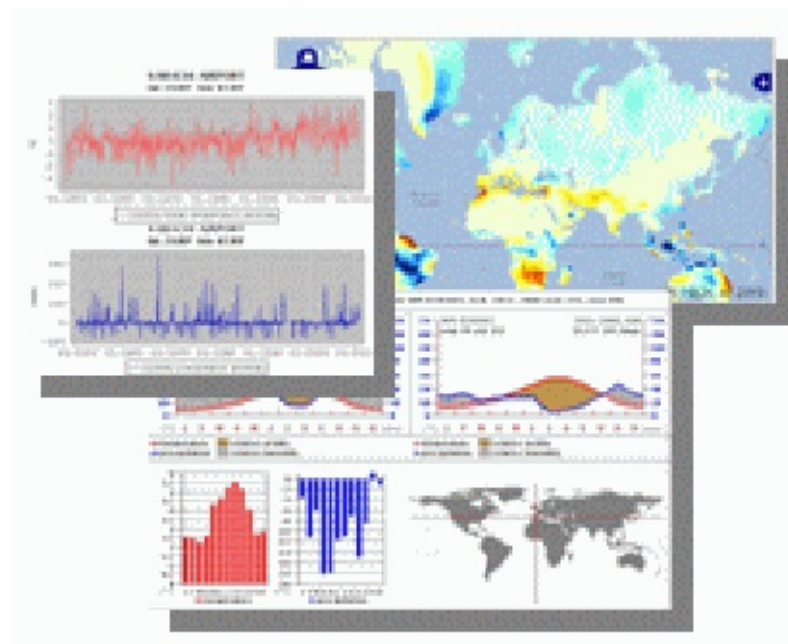
Markus Wrobel

Outline

- Introduction: ci:grasp, jABC
- Motivation for Agile Workflow Framework
- Sea Level Rise Example
- Conclusion and Future Work

A **web-based** climate information service aims to support decision makers to:

- better understand impacts of climate change [2]
- prioritize **adaptation** needs (e.g. risk mitigation)
- plan and implement appropriate adaptation measures (e.g. prevention and avoidance) [1]
- More than 400 adaptation projects and thousands of climate information maps

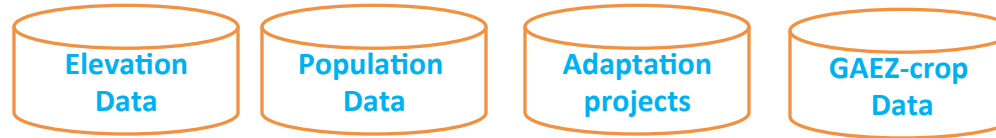


<http://www.pik-potsdam.de/cigrasp-2/>

- Based on R SRTMtools package [3 ,4, 5, 6]
- Based on enormous datasets
- Provides a very rich and well-organized collection of data



Predefined
data sets



What about
my data ?

Develop processes
to convert,
resample and
create climate
information



What about
my processes ?

Provide users with a
web-based climate
information service

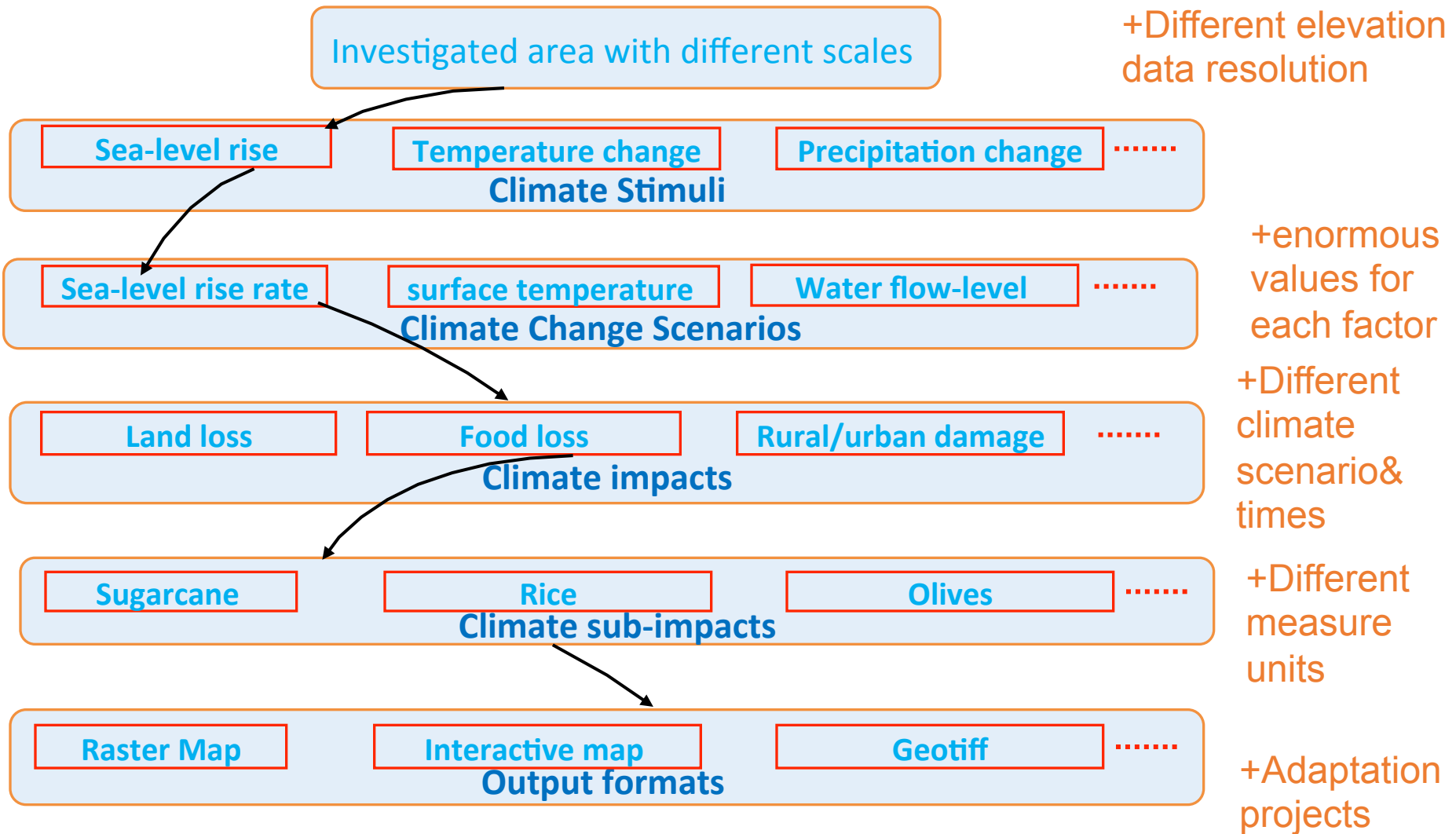


However with
predefined
scenarios

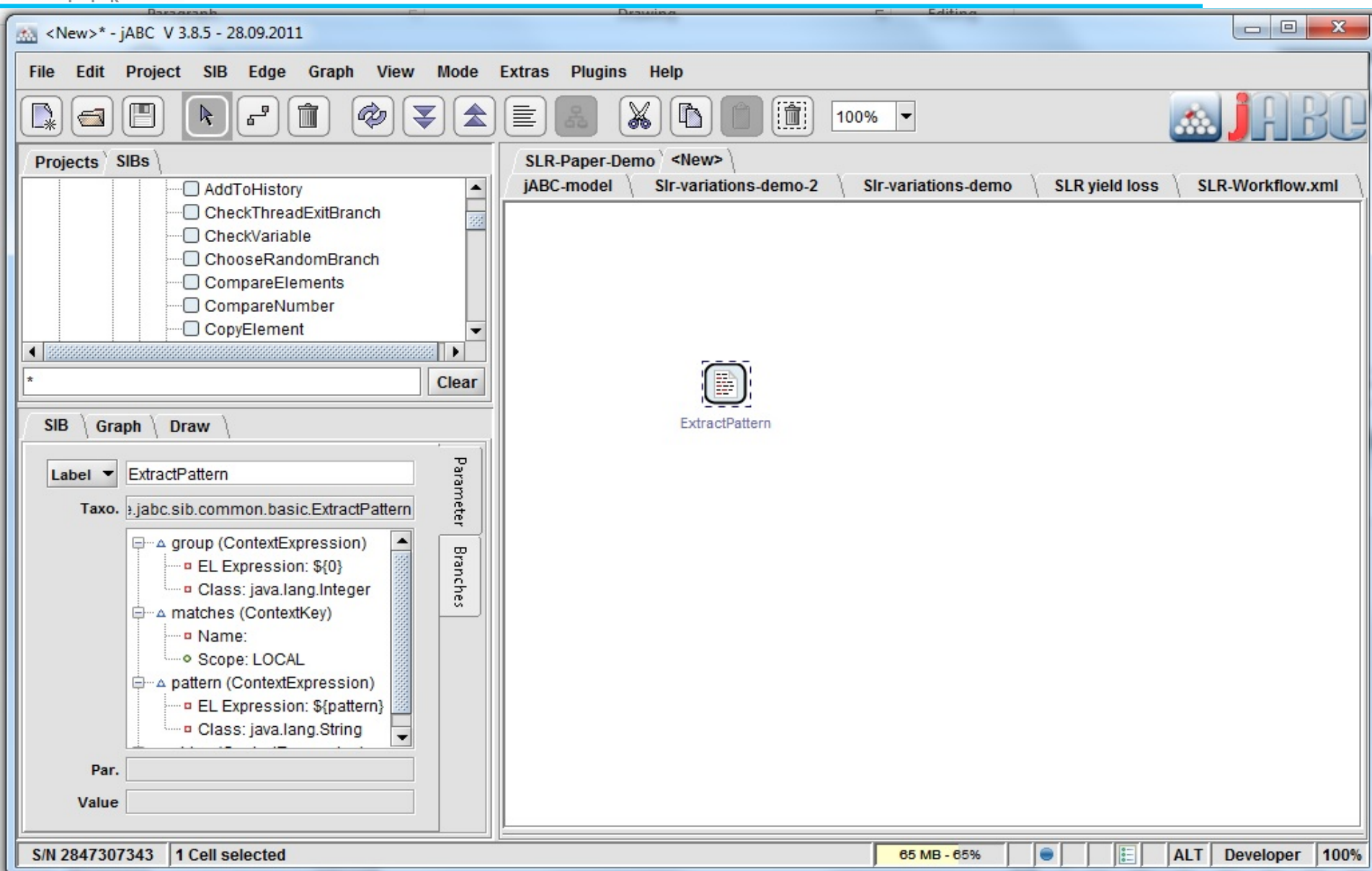


What about
my scenarios ?

Configuration Complexity example



- jABC is a multi-purpose and domain-independent framework for model-driven application development [9]
- It inherits the power of eXtreme Model-Driven Design (XMDD) to support a very agile and cooperative development of service-oriented systems [7, 8]
- Enables users to easily use and compose services into agile workflows [10]
- Provides users with a comprehensive and intuitive graphical user interface that facilitates workflow development also for end users



<New> * - jABC V 3.8.5 - 28.09.2011

File Edit Project SIB Edge Graph View Mode Extras Plugins Help

Projects SIBs

- ☐ AddToHistory
- ☐ CheckThreadExitBranch
- ☐ CheckVariable
- ☐ ChooseRandomBranch
- ☐ CompareElements
- ☐ CompareNumber
- ☐ CopyElement

SLR-Paper-Demo <New>

jABC-model SLr-variations-demo-2 SLr-variations-demo SLR yield loss SLR-Workflow.xml

ExtractPattern

SIB Graph Draw

Label ExtractPattern

Taxo. j.abc.sib.common.basic.ExtractPattern

- group (ContextExpression)
 - EL Expression: \$ {0}
 - Class: java.lang.Integer
- matches (ContextKey)
 - Name:
 - Scope: LOCAL
- pattern (ContextExpression)
 - EL Expression: \$ {pattern}
 - Class: java.lang.String

Par.

Value

S/N 2847307343 1 Cell selected 65 MB - 65% ALT Developer 100%

jABC-model - C:\Users\samih.AT8\Dropbox\Progress\Scenario-progress\SLR-impact-workflow-10-5-2014\working-directory\jABC_model.xml - jABC V 3.8.5 - 28.09.2011

File Edit Project SIB Edge Graph View Mode Extras Plugins Help

100%

Projects **SIBs**

- ☐ AddToHistory
- ☐ CheckThreadExitBranch
- ☐ CheckVariable
- ☐ ChooseRandomBranch
- ☐ CompareElements
- ☐ CompareNumber
- ☐ CopyElement
- ☐ CopyExpression
- ☐ EvaluateBoolean
- ☐ EvaluateCondition

Clear

SIB **Graph** **Draw**

Label:

Taxo:

Parameter

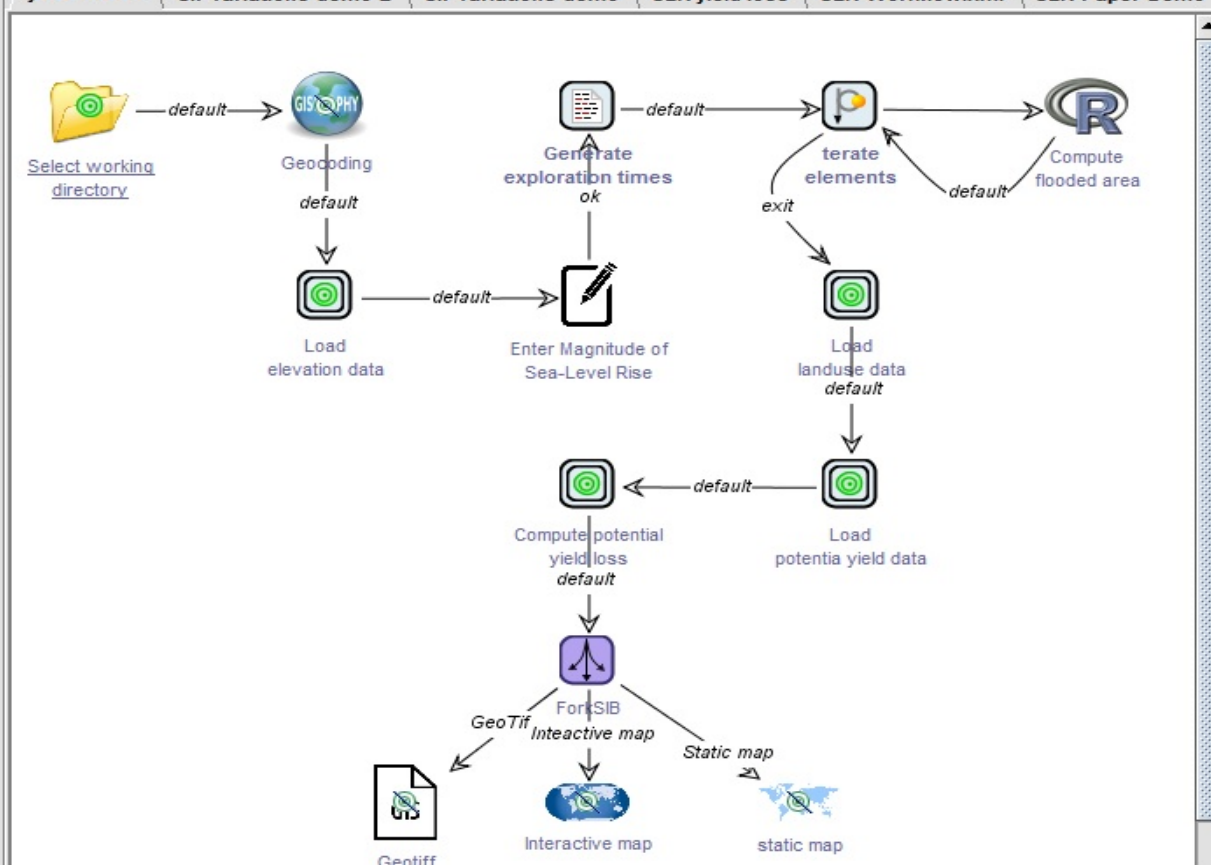
Branches

Par:

Value:

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jABC-model | SLR-variations-demo-2 | SLR-variations-demo | SLR yield loss | SLR-Workflow.xml | SLR-Paper-Demo



```

graph TD
    Start[Select working directory] -- default --> Geocoding[Geocoding]
    Geocoding -- default --> LoadElevation[Load elevation data]
    LoadElevation -- default --> EnterSLR[Enter Magnitude of Sea-Level Rise]
    EnterSLR -- ok --> GenerateTimes[Generate exploration times]
    GenerateTimes -- default --> ComputeFlooded[Compute flooded area]
    ComputeFlooded -- exit --> LoadLanduse[Load landuse data]
    ComputeFlooded -- default --> ComputeFlooded
    LoadLanduse -- default --> LoadYield[Load potential yield data]
    LoadYield -- default --> ComputeYieldLoss[Compute potential yield loss]
    ComputeYieldLoss -- default --> ForSIB[For SIB Interactive map]
    ForSIB -- GeoTiff --> GeoTiff[GeoTiff]
    ForSIB -- Interactive map --> InteractiveMap[Interactive map]
    ForSIB -- Static map --> StaticMap[Static map]
  
```

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jABC-model* - C:\Users\samih\Dropbox\PIK\SLR-impact-workflow-01-4-2014\working-directory\jABC_model.xml - jABC V 3.8.5 - 28.09.2...

File Edit Project SIB Edge Graph View Mode Extras Plugins Help

Projects SIBs

- SLR_Paper_Demo.xml
- SLR_Paper_Demo-al.xml
- SLR_rates_iteration.xml
- SLR_Taxonomies.xml
- SLR_variations_demo.xml
- SLR_workflow_demo.xml
- SLR_Yield_Loss.xml
- SLR-Workflow.xml
- variation.xml
- workflow_reuse_demo.xml
- working_directory.xml
- Yield_data_condition.xml
- Yield_Data.xml

GEAR [Basic] APs SIB Icon

SIB Graph Draw LocalChecker

Label iterate
elements</center>

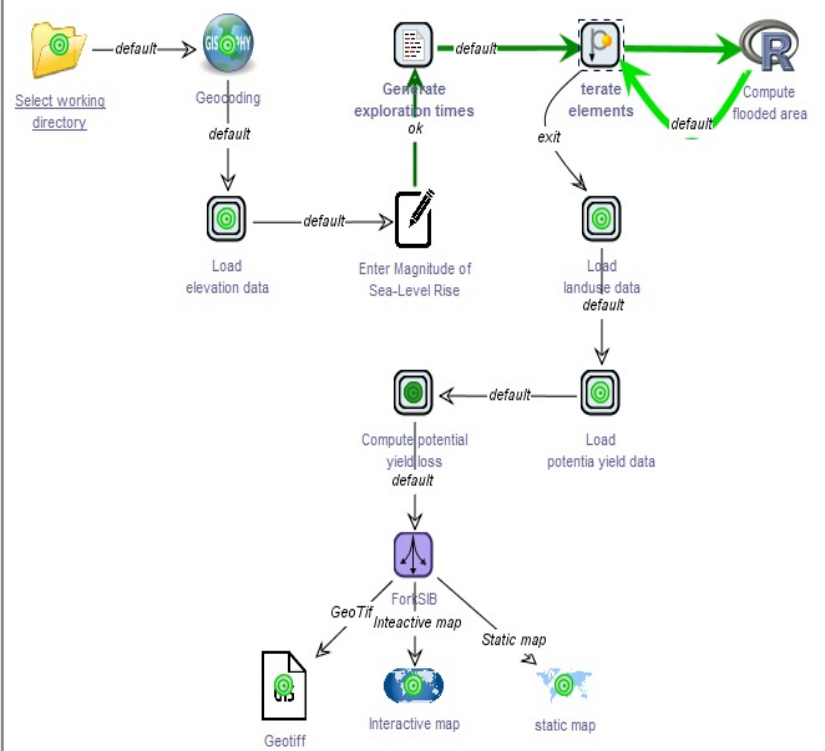
Taxo. mmon.collection.IterateElements

- collection (ContextKey)
 - Name: landclasslist
 - Scope: DECLARED
- element (ContextKey)
 - Name: class
 - Scope: LOCAL
- iterator (ContextKey)
 - Name: iterator
 - Scope: LOCAL

Par. Value

isola-example-2 SLR.rates-iteration

SLR-Workflow.xml Compute Potential Yield Loss Select yield Type jABC-model SLR-variations-demo



135 MB - 50% ALT Developer 100%

Execution [jABC-model]

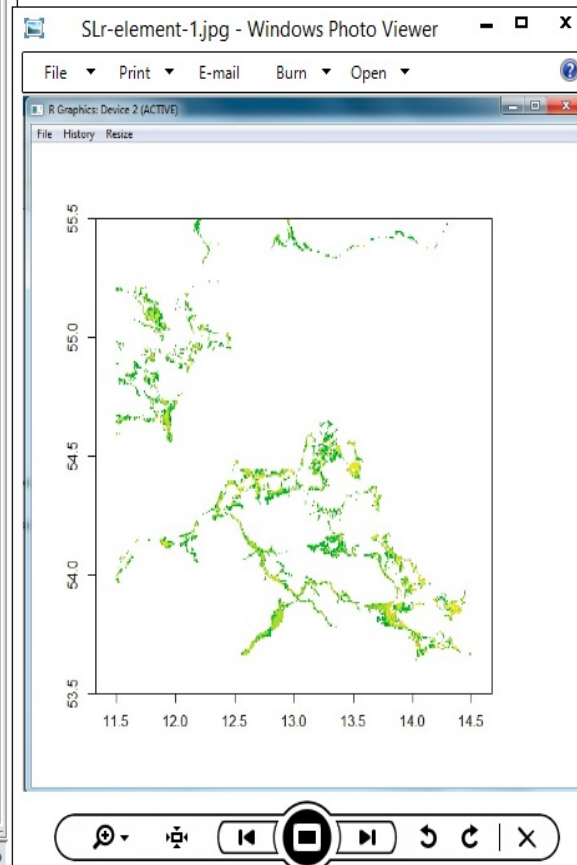
Always on top

Ignore breakpoints

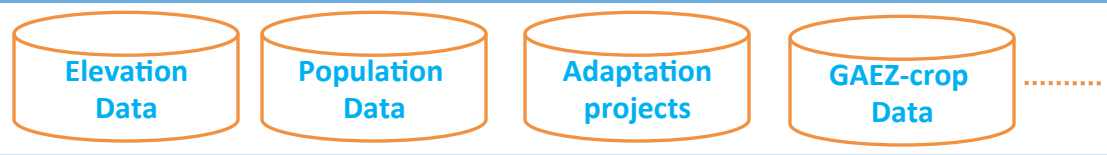
Fade edge color

Status: PAUSED

details >>>



Predefined
data sets



+Users' data
And other

Services for all
processing steps
(load, convert,
resample and
compute)



Integrate other
services
(SOAP, REST,
and others)

Provide users with
an easy and
tailored way to
perform multi
objective workflows

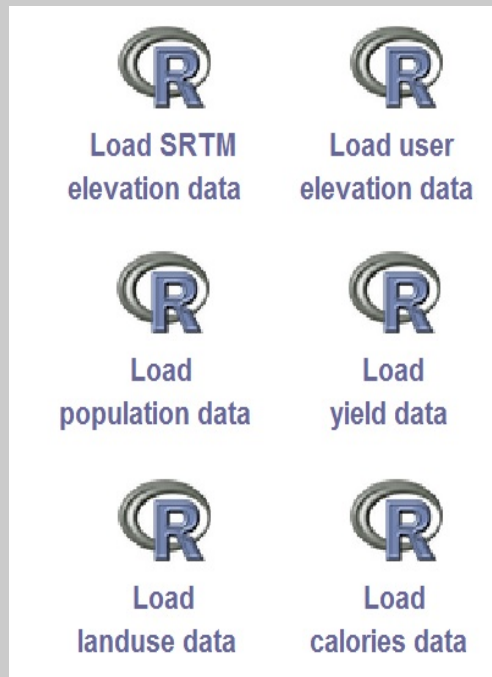


Different users with their own scenarios

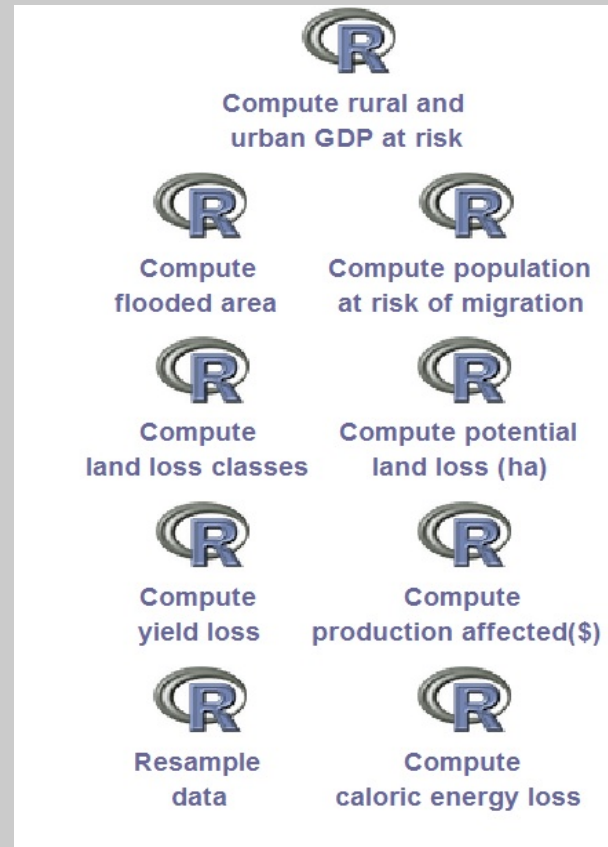
Agile Workflow Framework

- Servification of SLR climate impact assessment tools
- Agile Workflow design

Servification of SLR climate impact assessment tools



Loading Services

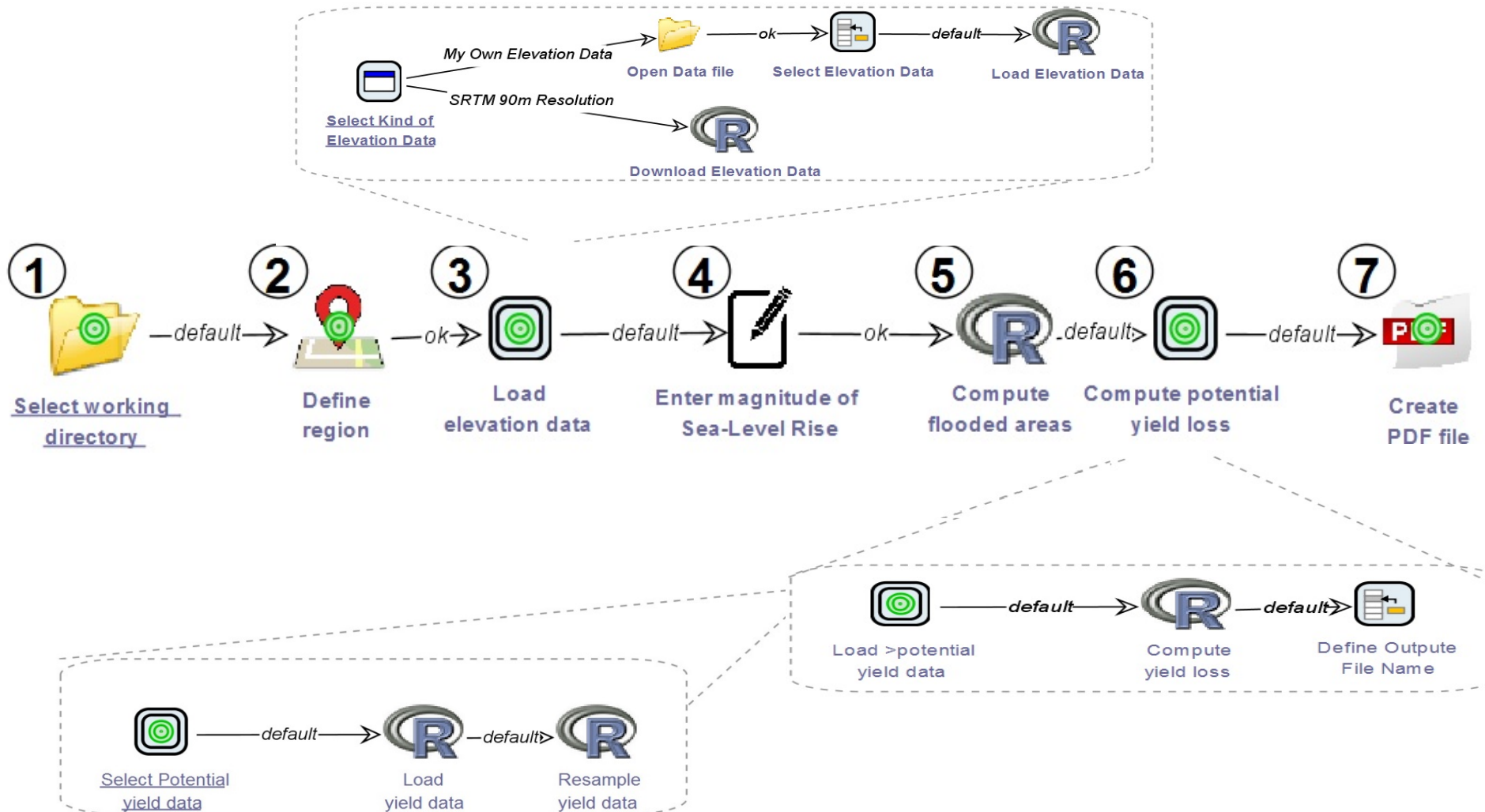


Computation Services

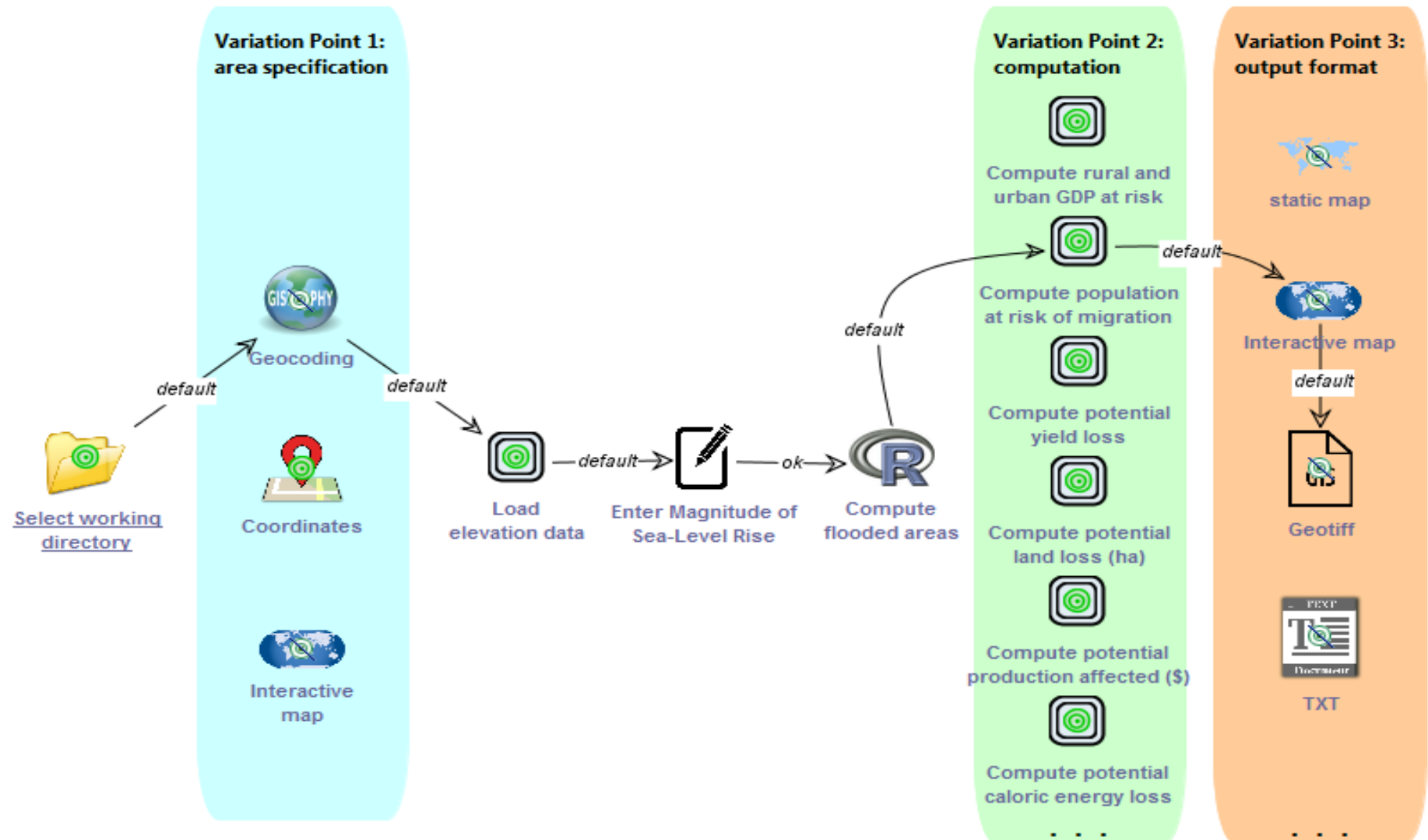


Output Services

Example: Address the effects on livelihood and society



SLR workflow: Preconfigured variation points



Conclusion

- Opening the processes development work in the area of climate change impacts to users will improve the **productivity, quality and stakeholder collaboration and satisfactions**
- Offering a rigorous **service orientation** for processes in ci:grasp will improve reusability of climate impact analysis services.
- Agile framework provides users with **advanced flexibility features** to create their **tailored workflows**.
- The workflow development addressed in this work focuses on the **modeling level** (on the layer where the service composition takes place)

Ongoing Work

- Release preconfigured versions of individual workflows via the **ci:grasp website**
- More flexible workflows with inclusion of **various, heterogeneous data sources** can be achieved with additional **SIBs**
- Use of **semantics-based workflow design methodology** based on **domain-specific ontologies** [10,11,12]

For more information

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