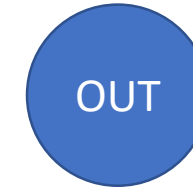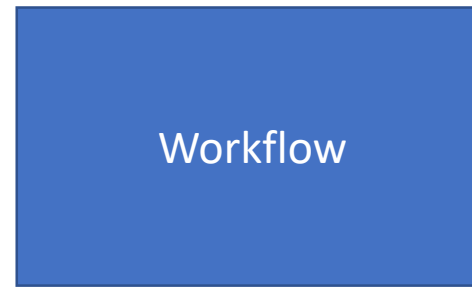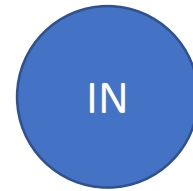# SCIENTIFIC WORKFLOWS

driven by simplicity

How to characterise scientific workflows?

INPUTS?

OUTPUTS?

FLOWS ?

IN

Workflow

OUT

Are these just tools?

EVEN THE BEST AND SIMPLE TOOLS
MIGHT FALL INTO WRONG HANDS

What we would like to share

User is the key component of the scientific workflows

User Centric Scientific Workflows ?

driven by simplicity

User Centric Scientific Workflows !!!

driven by simplicity

Let's look for evidence

EVIDENCE #1

"Scientific workflows are often constructed by scientists themselves — experts in their domains, but **not necessarily experts in information technology,** the software or networking domains in which the tools and workflows operate."

Dr. Mladen Vouk, NC State University

What do scientists/researchers say about the scientific workflows?

CLAIM #1:

Scientists need an expertise from user-oriented IT specialists.

EVIDENCE #2

" In the case of scientific workflows, it is the primary objective of the interface to **hide** appropriately the technical details of the underlying **information technology from the end-user**, and yet at the same time help the user convert the abstract ideas into executable workflows, and run those workflows, without limiting the end-user productivity. "

Magnus Alastair Ramage The Open University (UK)

What do scientists/researchers say about the scientific workflows?

CLAIM #2:

Scientific workflows architecture should cover the technical layer with a user-oriented technology solutions.

EVIDENCE #3

"

Use of workflows (...) does not seem to be related to the volume of documentation associated with the workflow nor the number of tags (...) assigned to the workflow, but is related to **the degree of community engagement with the workflow as exhibited by number of citations, comments, ratings and reviews**

"

William Michener, University of New Mexico

What do scientists/researchers say about the scientific workflows?

CLAIM #3:

Scientific workflows usage is directly connected with the community of users.

What do ECMWF might think about the scientific workflows?

FLEXIBILITY

Reproducibility

Flexibility

Flexibility - user is the one who identifies the criteria of elasticity

Reproducibility

Reproducibility - user is the one to reproduce

Conclusion

The user is the key ingredient to assure flexible and producible scientific workflow
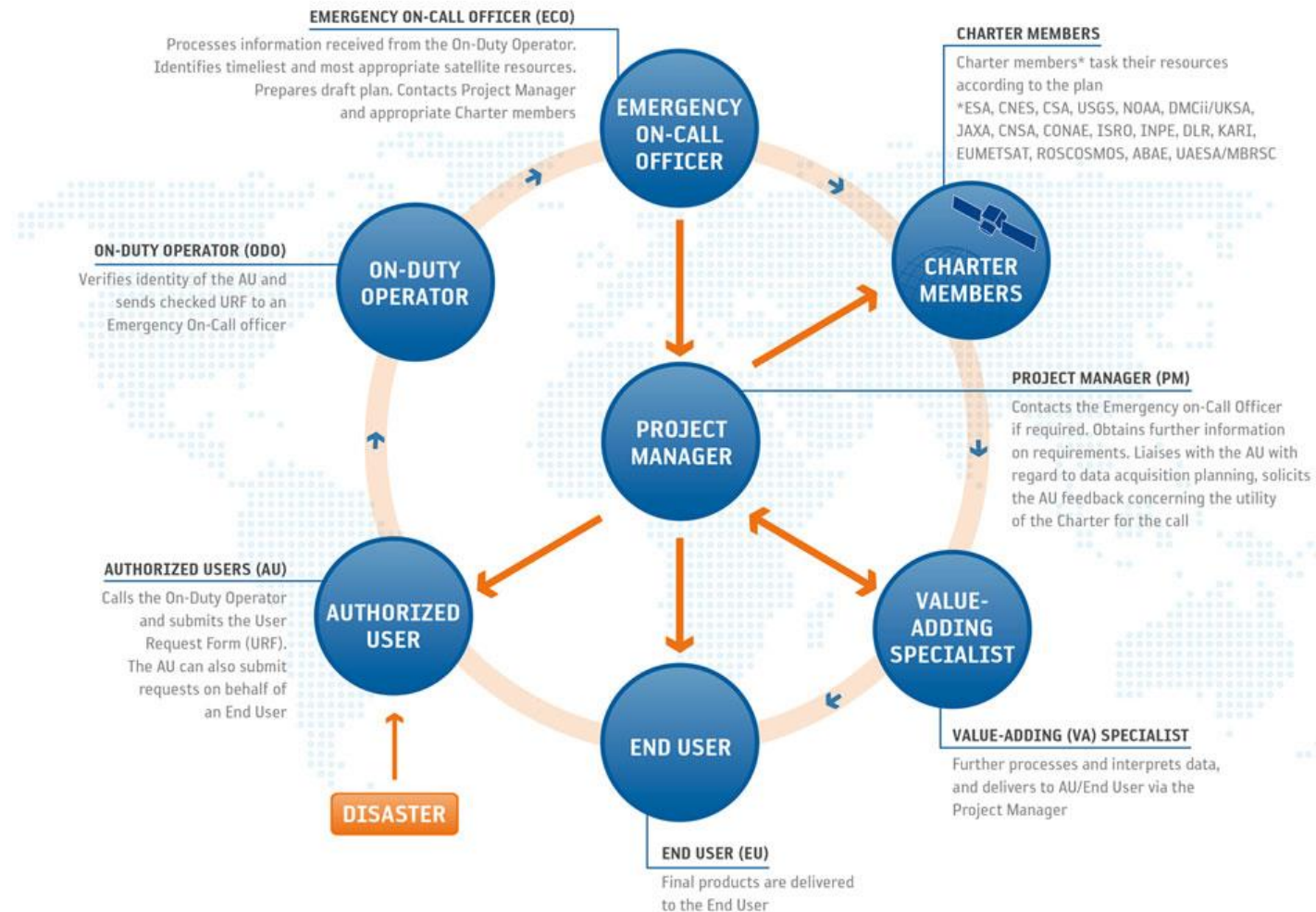
Our experience

driven by simplicity

CLAIM #1:
Scientists need an expertise from user-oriented IT specialists.

Experience with the International Charter for Space and Major Disasters

EMERGENCY ON-CALL OFFICER (ECO)
Processes information received from the On-Duty Operator. Identifies timeliest and most appropriate satellite resources. Prepares draft plan. Contacts Project Manager and appropriate Charter members

CHARTER MEMBERS
Charter members* task their resources according to the plan
*ESA, CNES, CSA, USGS, NOAA, DMCii/UKSA, JAXA, CNSA, CONAE, ISRO, INPE, DLR, KARI, EUMETSAT, ROSCOSMOS, ABAE, UAESA/MBRSC

ON-DUTY OPERATOR (ODO)
Verifies identity of the AU and sends checked URF to an Emergency On-Call officer

PROJECT MANAGER (PM)
Contacts the Emergency on-Call Officer if required. Obtains further information on requirements. Liaises with the AU with regard to data acquisition planning, solicits the AU feedback concerning the utility of the Charter for the call

AUTHORIZED USERS (AU)
Calls the On-Duty Operator and submits the User Request Form (URF). The AU can also submit requests on behalf of an End User

VALUE-ADDING (VA) SPECIALIST
Further processes and interprets data, and delivers to AU/End User via the Project Manager

EMERGENCY ON-CALL OFFICER

CHARTER MEMBERS

ON-DUTY OPERATOR

PROJECT MANAGER

AUTHORIZED USER

VALUE-ADDING SPECIALIST

END USER

DISASTER

END USER (EU)
Final products are delivered to the End User

What we did for them?

- We analysed the IT possibility of creation of M2M access to the data (including tasking for the data)

- We improved user experience by analyzing user needs. Focusing on the user helped to develop a specified dashboards with limited and simple functions, iconographic and prompts

In result:

✓less errors on the process increase (no bottle necks)

✓Increase in the data ordering and upload (app. factor 20)

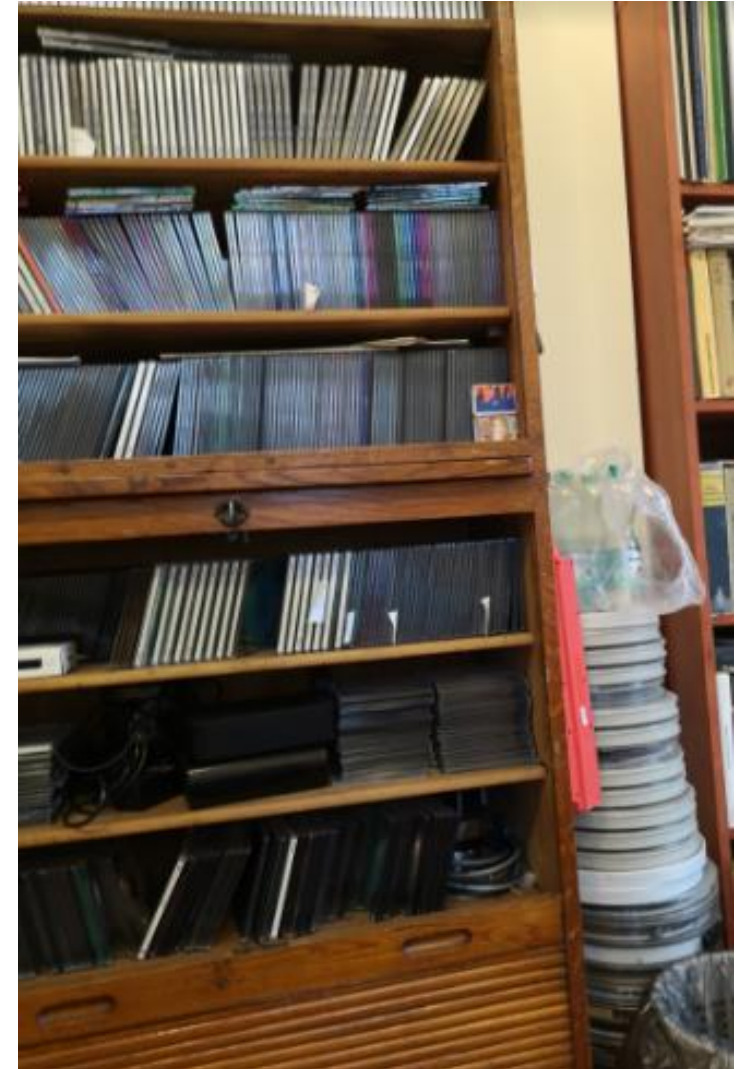✓Tool is currently used in daily routine by crisis management entities

CLAIM #2:
Scientific workflows usage is directly connected with the community of users

Experience with the SSA-VRE community

SSA Environment Challenges

- How to enable Data Access
- How to standardise the tools
- How to improve cooperation in research
- How not to worry about IT

What we did for them?

- We did:
  - Survey on the end-user needs (500 persons approached)
  - Interviews with the specialist (10 interviews)
  - Open workshop in ESA (public review of the concept)
  - Creation of the fully functional Demo
- Results (intermediate)
  - ✓Online Integrated Development Environment for scientific purposes
  - ✓Leverage GIT (to the maximum)
    - ✓Versioning CODE
    - ✓Versioning the ENVIRONMENT
  - ✓Abstracting from architecture (Docker)

Short demo

Virtual Research Enviroment for
Space Situational Awareness

Technological demo #2 – Space Weather example

EVERSIS / driven by simplicity