

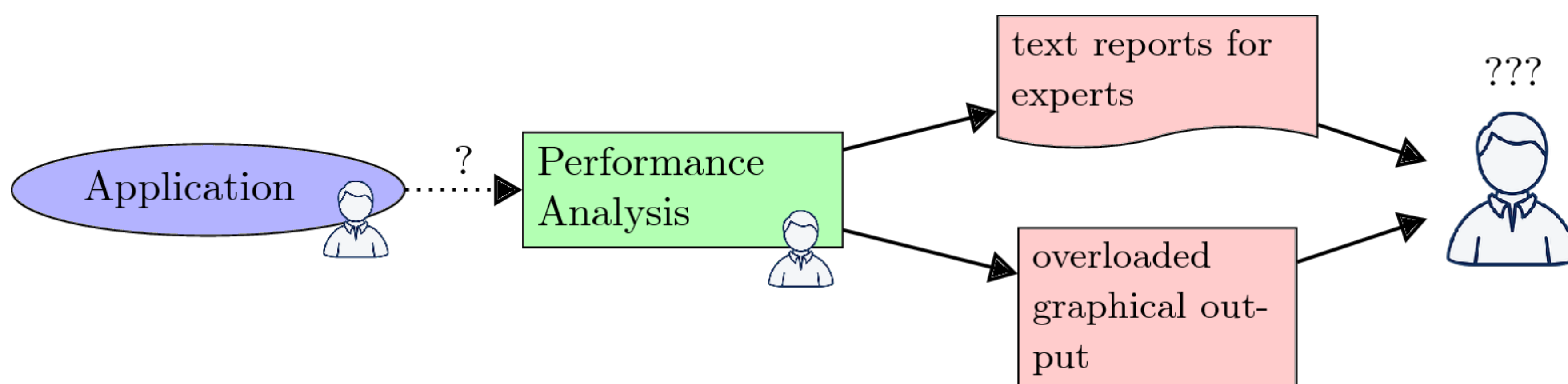
# A Profiling Toolkit for HPC in Tiers 2 and 3

01.02.2017 – 31.01.2020



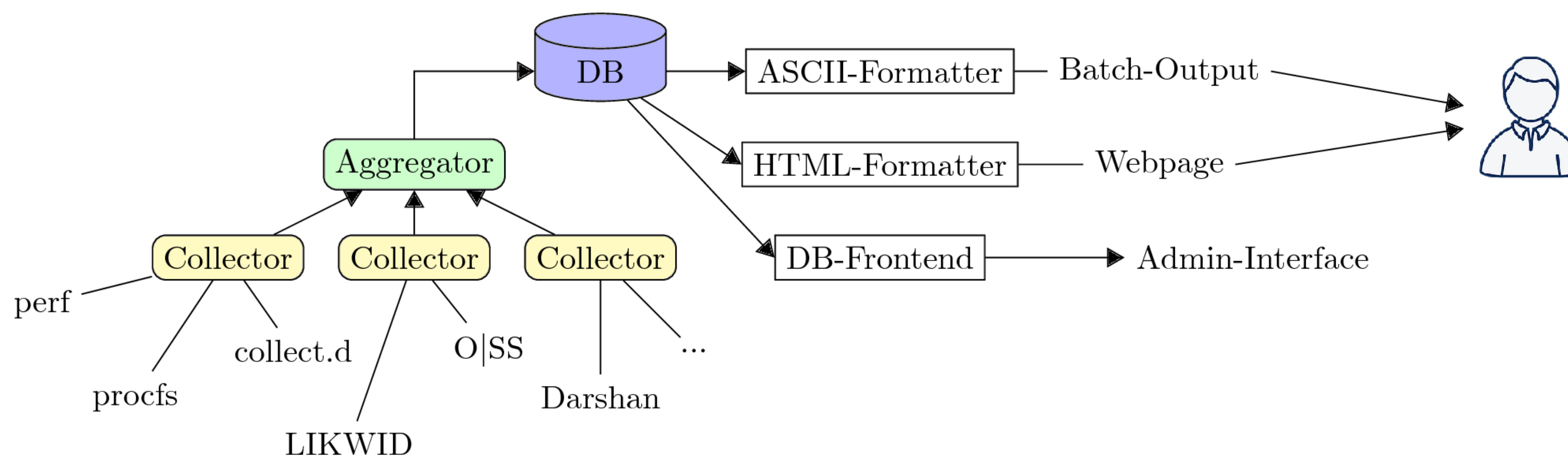
## Problem

HPC has become a standard tool in almost every scientific discipline. Therefore, the users have very different background knowledge of HPC resources – from the beginner to the expert level. At the same time, the HPC systems become more and more complex, introducing a knowledge gap and detaining the users from exploiting the possibilities of performance engineering and analysis.



## Our Idea and Goal

The project aims at increasing the awareness of users of HPC resources regarding the possibilities of performance analysis. As an important step towards this goal, we see the automation of basic performance analysis tasks. Furthermore, users need to get pre-processed, easily understandable feedback on their application's performance along with suggestions on further steps to be taken. Of course, all users will have the possibility to opt-out from the automatic performance analysis.



## Consortium

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## WP3 - Metric Collection

Design of the backend and its distributed architecture containing:

- data collector and filter,
- aggregator and
- database backend as storage,

with scalability, modularity and reliability in mind.

## WP4 - User Feedback

Definition of performance indicators and implementation of their presentation. A multi-level user feedback is planned for the toolkit:

1. Basic ASCII output - preferably together with the output from the batch system.
2. Graphical feedback (PDF or web-based):

### Network Usage



### Disk I/O



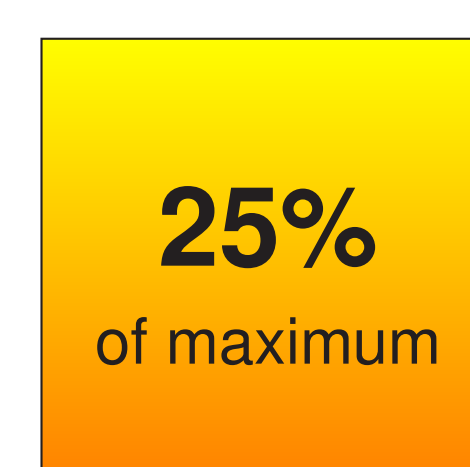
### Memory Usage



Communication



Instructions/Cycle



Bandwidth

3. Additional expert interface for advanced users or administrators.

## Project Work Packages

**WP1** Tiers 2 and 3 infrastructure survey and requirement analysis

**WP2** Evaluation of metrics and tools

**WP3** Implementation of metric collection

**WP4** Implementation of the metric presentation

**WP5** Documentation and best practices

**WP6** Project management and dissemination

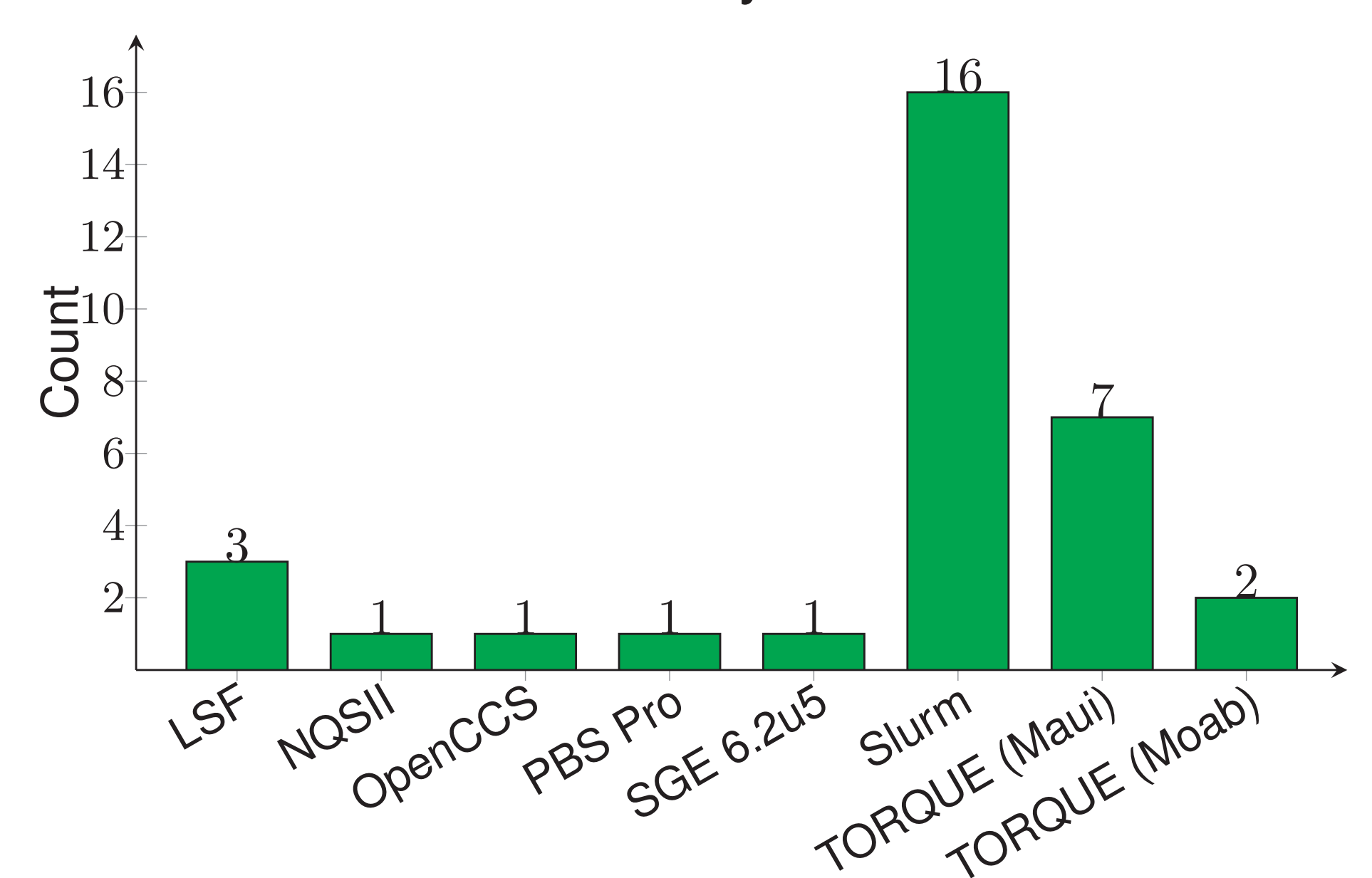
## WP1 - Survey Results

Online survey to evaluate the infrastructure and software of German Tiers 2 and Tiers 3 centres for the requirement analysis for our performance tool. Below, results from 31 participating institutes are shown.

### TOP 6 - Profiling Tools

Intel VTune (19)	SYSSTAT (10)
vmstat (14)	Ganglia (10)
VampirTrace (11)	Scalasca (8)

### Batchsystems



In a second step, the results of this survey and the results from work package 2 will be bundled and evaluated to create a requirement analysis for a cross-tier service design.

## WP2 - Evaluation

This work package deals with an investigation of available performance measurement tools and metrics. This research will form a profound basis for the choice of tools to be used in the developed toolkit.

### D2.1 Concise Overview of Metrics and Tools

Description and rating of performance tools in different categories, important to our goals:

- Metric Categories: General, HW Counters, Memory, File System (I/O), MPI
- Data Collection Methods: Tracing, Sampling
- Operational Aspects: Automatability, Ease of Use, Overhead, Availability

The deliverable D2.1 is located online at <http://profit-hpc.de/downloads/>

### D2.2 Functional Specification of Backend

The functional specification of the backend will give an overview on how specific metrics can be retrieved from the tools in D2.1.