



# Sustainable IT Services

Sustainable & service-based cloud solutions for the Small or Medium-sized Enterprises(SME)

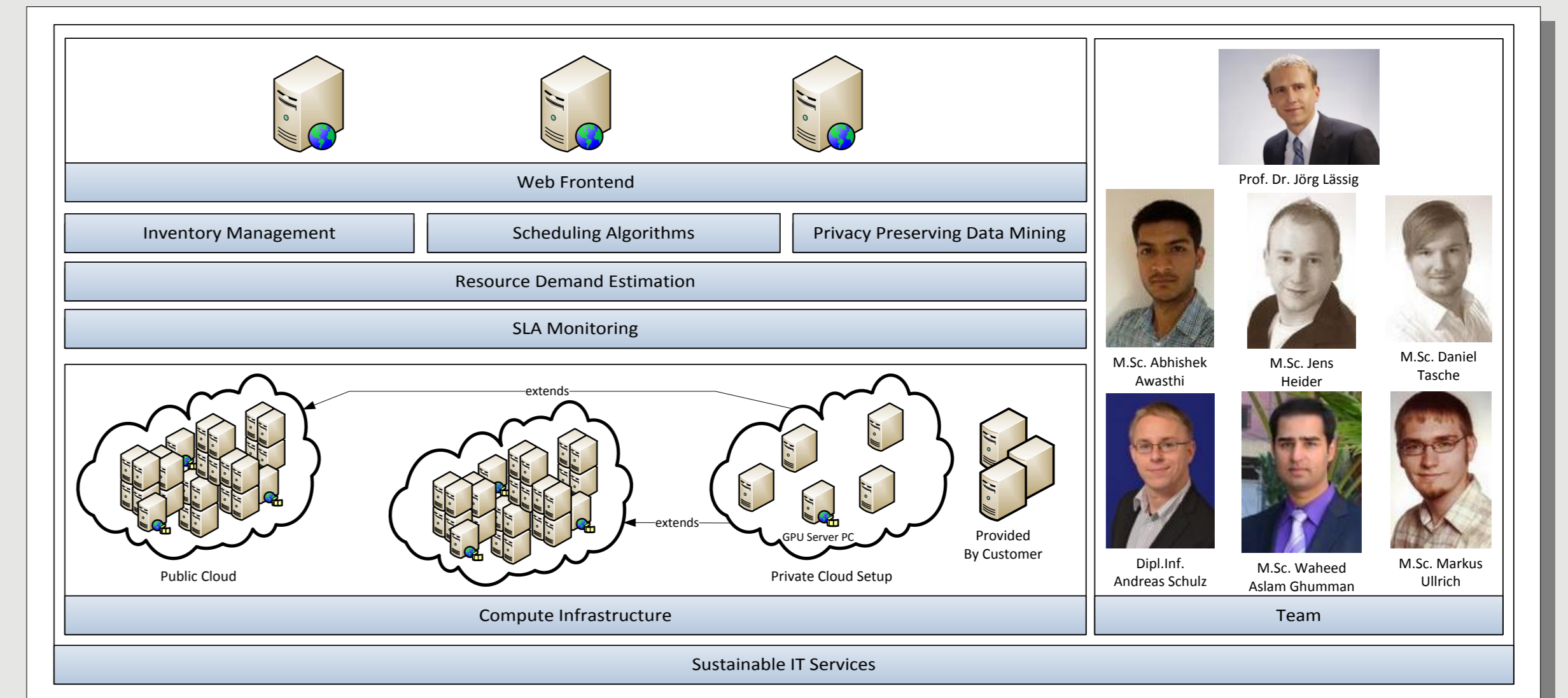
Markus Ullrich, Abhishek Awasthi, Andreas Schulz, Waheed Aslam Ghumman, Jörg Lässig

University of Applied Sciences Zittau/Görlitz, Enterprise Application Development Group, Görlitz, Germany  
www.Enterprise-Application-Development.org/

## Introduction

- Planning and optimization are an essential component of entrepreneurial activity
- Efficient planning and optimization of business processes increase business value
- Finding optimal solutions is reasonably time & cost consuming thus resulting in sub-optimal solutions for SMEs
- SustainableITServices project addresses these issues and provides a practical solution using different service based cloud solutions

## Project Overview



## Resource Demand Estimation Service

- Main goal is to use as much resources as necessary to meet QoS requirements but not more than required to not waste resources
- Novel methods for resource demand estimation:
  - combining existing research with new ideas
  - application classification to select proper estimation strategy
- Enables better understanding of current challenges and problems
- Enables comparison of resource demand estimation algorithms
- Prediction methods for optimized resource allocation in private and hybrid cloud environments

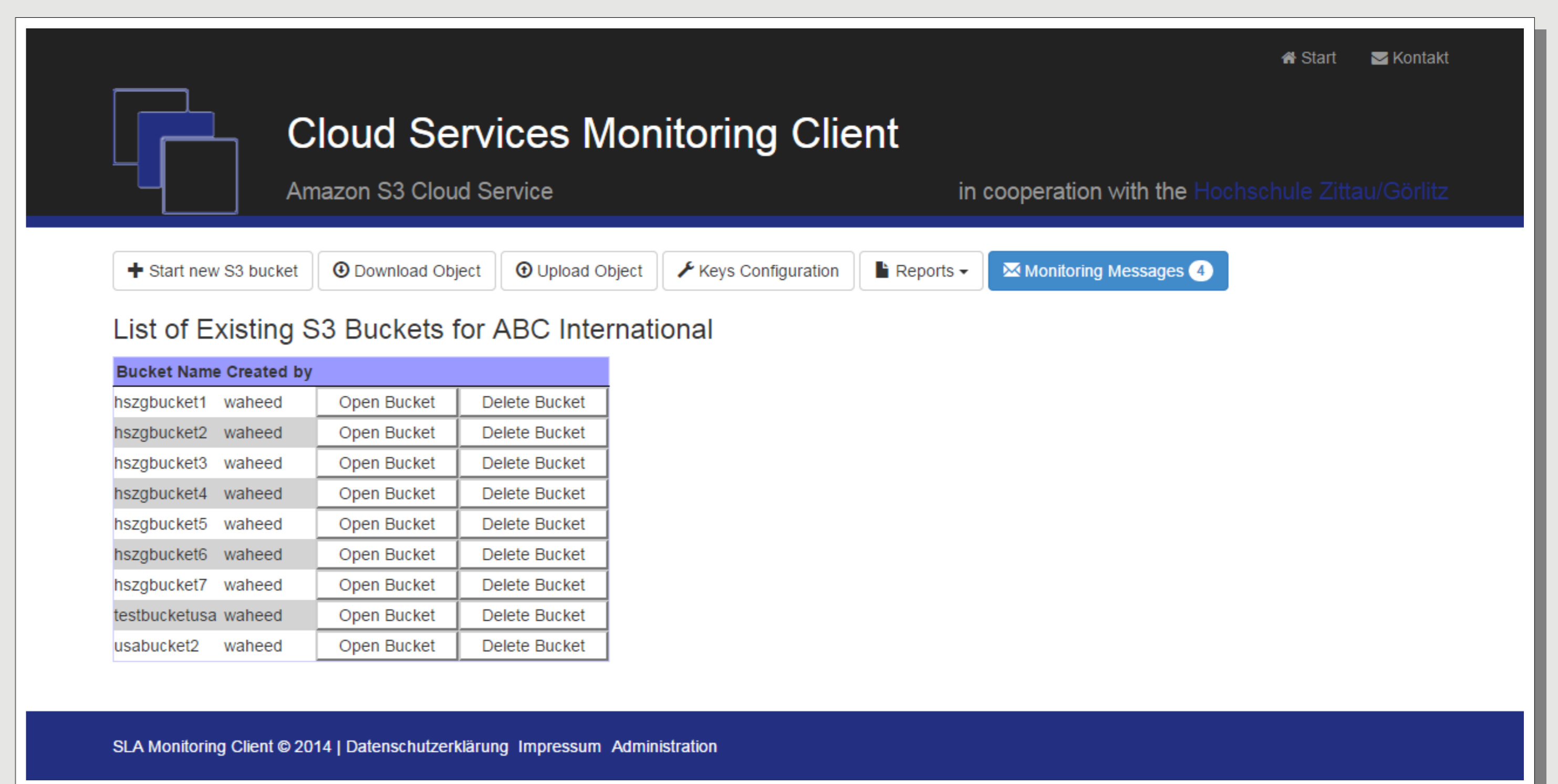
## SLA-based Cloud Service Monitoring

- This service provides unparalleled flexibility in service level monitoring for both internal and external cloud services
- Monitor the performance of external SaaS applications and web services to enforce service levels:
  - in real time with alerts
  - and for detailed analysis with historical data
- Keep employees and customers happy by monitoring cloud service performance at remote locations
- Quickly determine whether issues are internal or external. Diagnose where to look for the problem

## Prototype



Web front-end of Sustainable IT Services



Amazon S3 Cloud Service Monitoring Interface

## Inventory Management Services

- Interactive platform for managing multiple inventories
- Support for transshipments between different locations
- Simulation supporting different optimizations:
  - PSO (particle swarm optimization)
  - GA (genetic algorithms)
- Visualisations & reporting for comparing results
- Heavy jobs run on a cluster environment
- Efficient & minimal usage of compute, storage and network resources for optimized inventory management

## Services for Optimization of NP-Hard Scheduling Problems

- Algorithmic solutions to combinatorial optimization problems
- Polynomial algorithms for scheduling and heuristics for sequencing
- Parallel algorithms utilizing graphical processing Units (GPUs) on Nvidia CUDA
- Comparison of heuristic algorithms for the NP-Hard problems on several platforms
- Achieved speed up of 25x, within a deviation of 10%
- Problems dealt with, include:
  - Aircraft Landing Problem
  - Common Due-Date Problem (CDD)