



# PRACE in a Nutshell

## CERN/PRACE Workshop 22 October 2018

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Serge Bogaerts

*PRACE Managing Director*



# PRACE | what we do

- ▶ **Open access** to world-class HPC systems to EU scientists and researchers
- ▶ **Variety of architectures** to support the different scientific communities
- ▶ High standards in **computational science** and engineering
- ▶ **Peer Review** at European level to foster scientific excellence
- ▶ Robust and persistent **funding scheme** for HPC supported by national governments and European Commission (EC)
- ▶ Support the development of intellectual property rights (**IPR**) in Europe by working with industry and public services
- ▶ Collaborate with European HPC **industrial** users and suppliers



# PRACE | achievements

- ▶ 652 scientific projects enabled
- ▶ >19 000 000 000 (billion) core hours awarded since 2010
- ▶ Of which 63% led by another PI nationality than the HM
- ▶ R&D access to industrial users with >50 companies supported
- ▶ >11 500 people trained through PRACE Training
- ▶ ~110 Petaflops of peak performance on 7 world-class systems
- ▶ 26 PRACE members, including 5 Hosting Members (France, Germany, Italy, Spain and Switzerland)
- ▶ PRACE is the only e-infrastructure Landmark on the ESFRI Roadmap 2016



# PRACE 2

- ▶ Ratified on **3 March 2017**
- ▶ From 2017 to 2020 with overlap with **PRACE 1**
- ▶ 21 of 25 Members contribute





# PRACE | membership

- **Hosting Members (HMs)** provide access to Tier-0 systems as **in-kind** participation to the PRACE Research Infrastructure (RI)
- **General Partners (GPs)** fund High-Level Support Teams (**HLST**) providing tailored user support on HMs' Tier-0 systems
- All **26** PRACE members contribute to **high-value services** including DECI, Implementation Projects, Peer Review, and dissemination & Communication



# PRACE | members

## Hosting Members

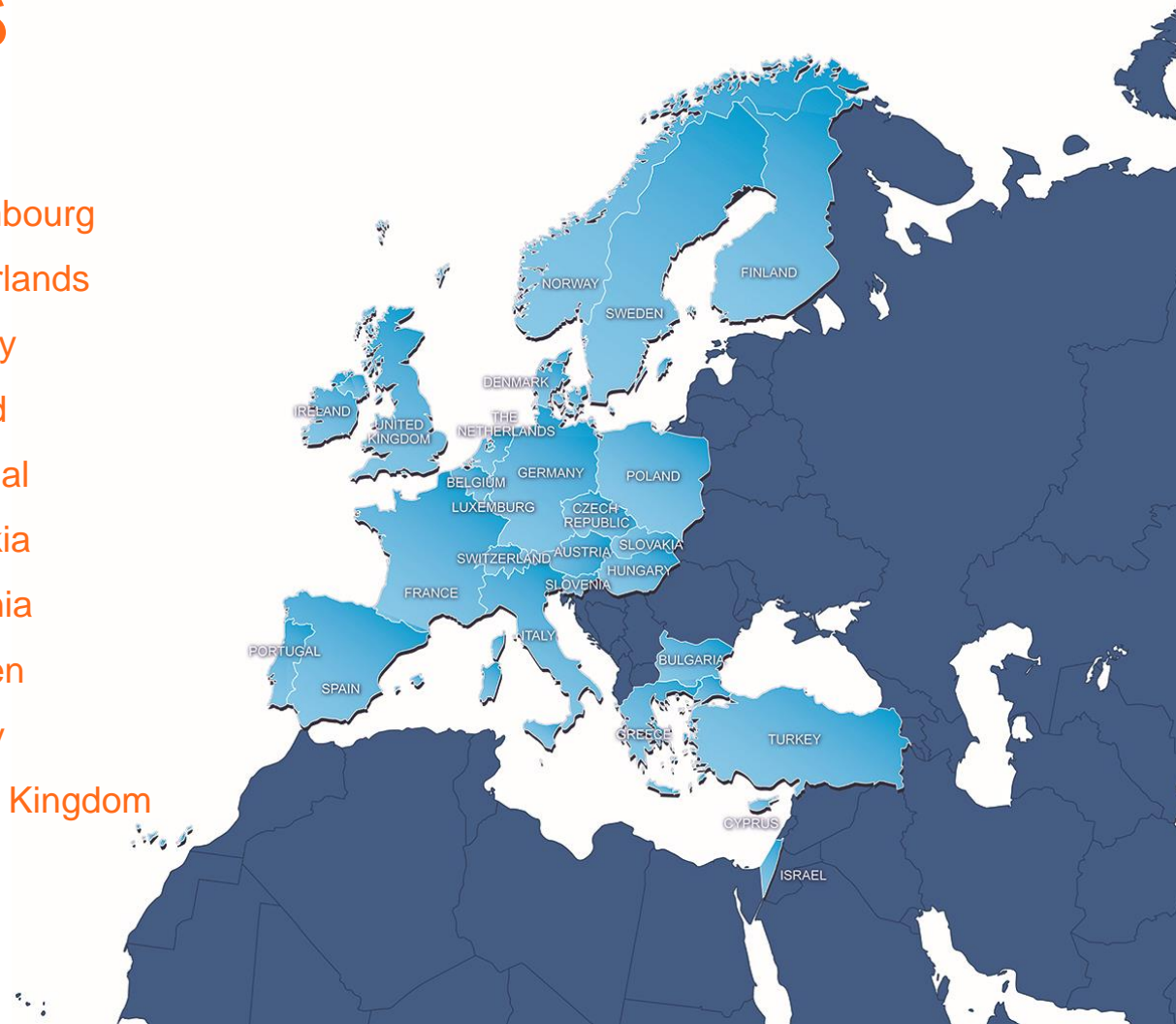
- ▶ France
- ▶ Germany
- ▶ Italy
- ▶ Spain
- ▶ Switzerland

## General Partners (PRACE 2)

- ▶ Austria
- ▶ Belgium
- ▶ Bulgaria
- ▶ Cyprus
- ▶ Czech Republic
- ▶ Denmark
- ▶ Finland
- ▶ Greece
- ▶ Hungary
- ▶ Ireland
- ▶ Israel
- ▶ Luxembourg
- ▶ Netherlands
- ▶ Norway
- ▶ Poland
- ▶ Portugal
- ▶ Slovakia
- ▶ Slovenia
- ▶ Sweden
- ▶ Turkey
- ▶ United Kingdom

## Observers

- ▶ Croatia
- ▶ Romania





# PRACE | Tier-0 Systems in 2018

**NEW ENTRY 2018**  
**JUWELS (Module 1)** Bull  
Sequana  
GAUSS @ FZJ, Jülich, Germany  
#23 Top 500



**MareNostrum** IBM  
BSC, Barcelona, Spain  
#22 Top 500



**Piz Daint** Cray XC50  
CSCS, Lugano, Switzerland  
#6 Top 500



**SuperMUC** Lenovo cluster  
GAUSS @ LRZ, Garching,  
Germany #57 Top 500  
**NEW ENTRY soon SuperMUC NG**



**Hazel Hen** Cray  
GAUSS/HLRS,  
Stuttgart, Germany  
#27 Top 500



**NEW ENTRY 2018**  
**JOLIOT CURIE** Bull Sequana  
GENCI/CEA, Bruyères-le-Châtel, France  
#34 Top 500



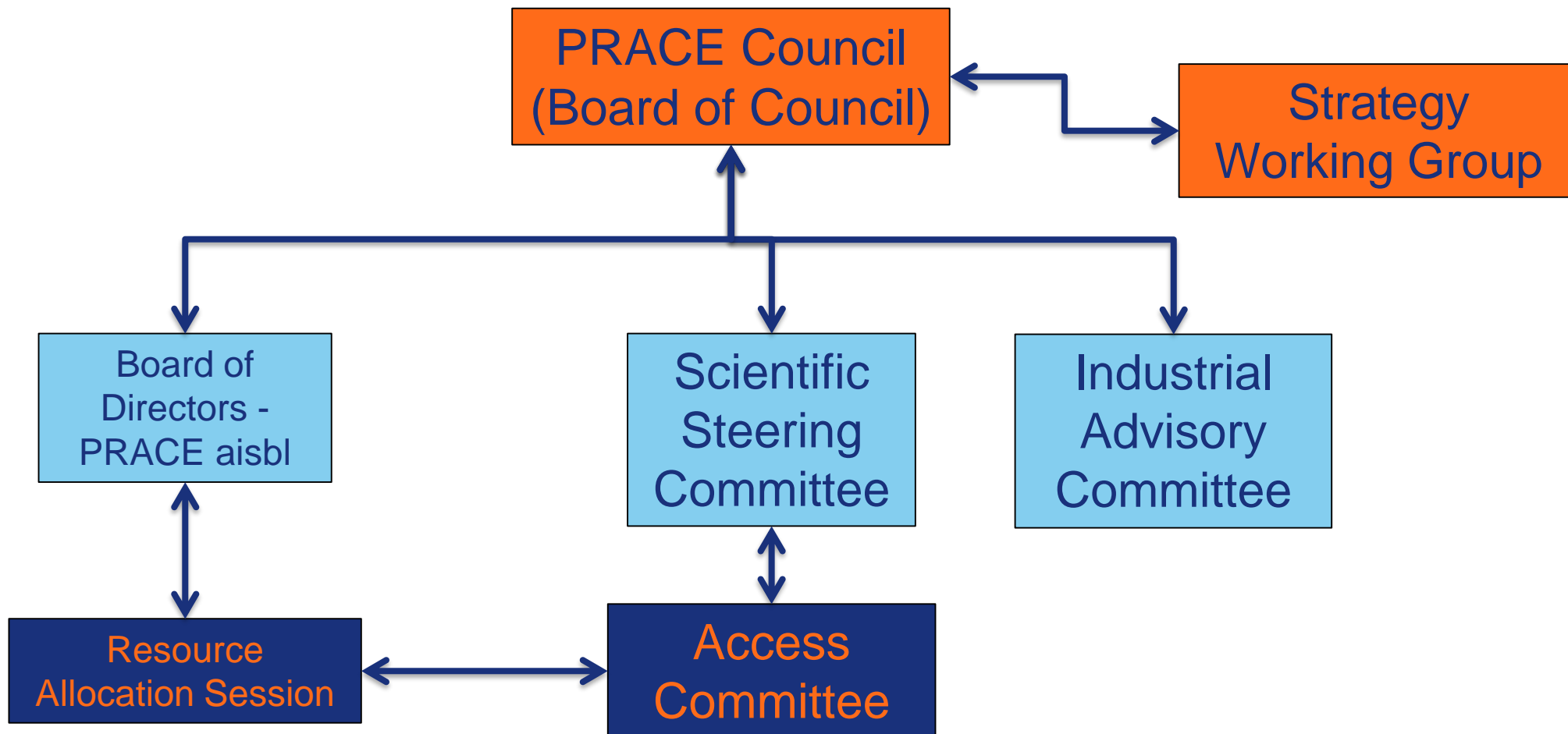
**MARCONI** Lenovo  
CINECA, Bologna, Italy  
#18 Top 500



**Close to 110 PFlops  
cumulated peak  
performance**



# PRACE | governance







# PRACE | current services

Towards End-Users

## Access

### Tier-0 systems (open R&D)

- Project Access  
1-3 years
- Preparatory Access  
Type A, B, C, D

### Tier-1 systems (open R&D)

- DECI Programme

## Support

### Application Enabling & Support

- Preparatory access Type C
- Preparatory access Type D
  - Tier-1 for Tier-0
- SHAPE
- HLST support

### Training

- Training Portal
- PATC, PTC
- Seasonal Schools & on demand
- International HPC Summer School
- MOOC
  
- Code Vault
- Best Practice Guides
- White Papers

## Communication, Dissemination, Outreach

- Website
- Public Relations
- Scientific Communication
- Summer of HPC

### Events

- PRACEdays
- SC, ISC, ICT, ICRI, DI4R, ...

### Operation & Coordination of the common PRACE Operational Services

- Service Catalogue
- PRACE MD-VPN network
- Security

### HPC Commissioning & Prototyping

- Technology Watch, PCP
- Infrastructure WS
- Best Practices
- UEABS

Towards PRACE Partners



# Addressing HPC **Exascale** challenges

- ▶ Aim at **scientific excellence** and improve application **scaling** and **throughput**
- ▶ Focus on PRACE Scientific Case Release date 17 Oct 2018
  - ▶ Computing requirements (capability-, capacity-, real-time-, burst-, cloud-computing, ...)
  - ▶ Data management (distributed (big) data processing, storage, HPDA, ...)
  - ▶ Networking requirements (AAA, SDN, QoS, ...)
  - ▶ Application development (portability, tools, libraries, ...)
- ▶ Specific exascale challenges
  - ▶ Parallelism of software, data movement, reliability, energy consumption, ...
  - ▶ System integration, software-, hardware-, services- and skills-development
  - ▶ Exascale performance only through **combination of improvements**
- ▶ **Pan-European** collaboration is needed

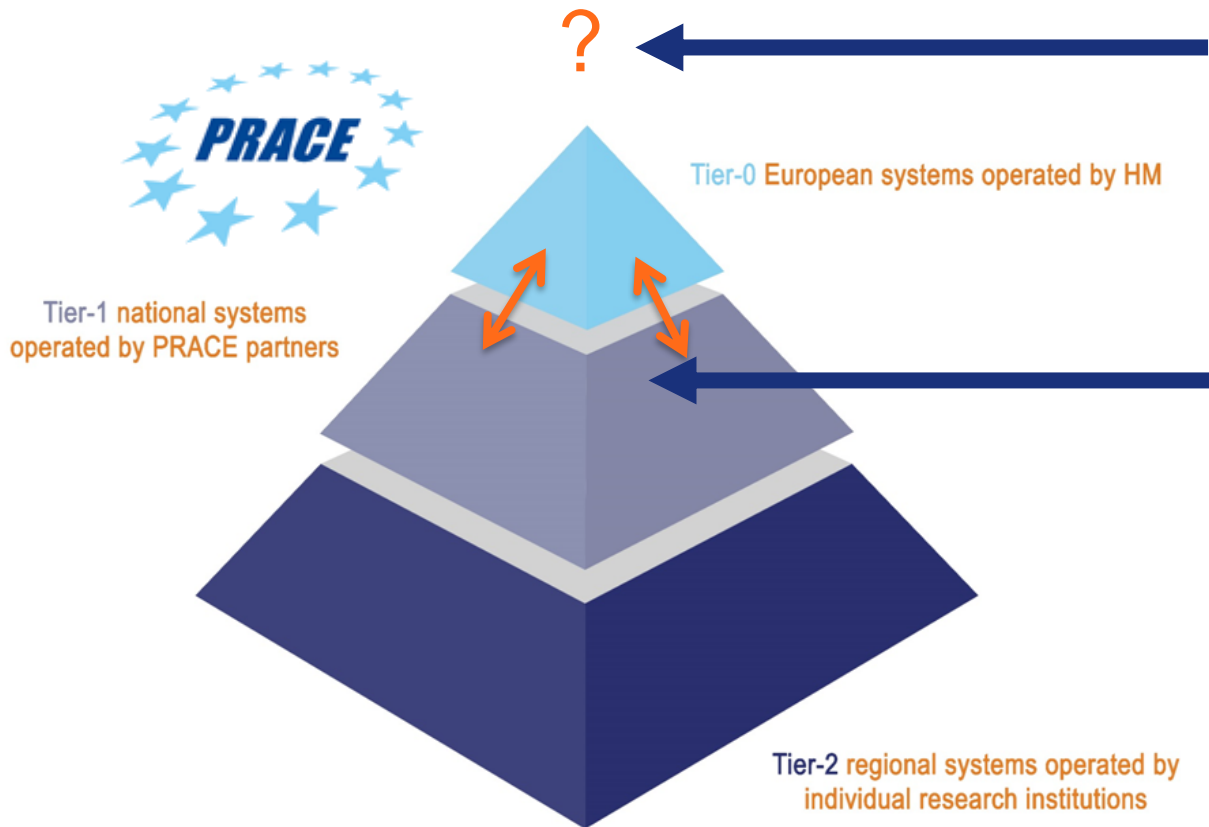
# Recipe for a **data-centric** approach

- ▶ Need to address the convergence of HPC, HTC, HPDA and AI
- ▶ Handle the large volume of data generated
  - ▶ **Rethink data movement** (edge / data center) & support end-to-end workflows
  - ▶ Offer computing capacity to large scale scientific instruments
- ▶ Enhance **integration** of the Tiers and connect to **EOSC**
- ▶ Anticipated key role of the **GÉANT** networking services (AAA, SDN, QoS, ...) and **FENIX** and **EUDAT** for data management and processing

**Piloting in Call 18**



# Strengthening the HPC pyramid



EuroHPC systems  
(exa- and pre-exascale)

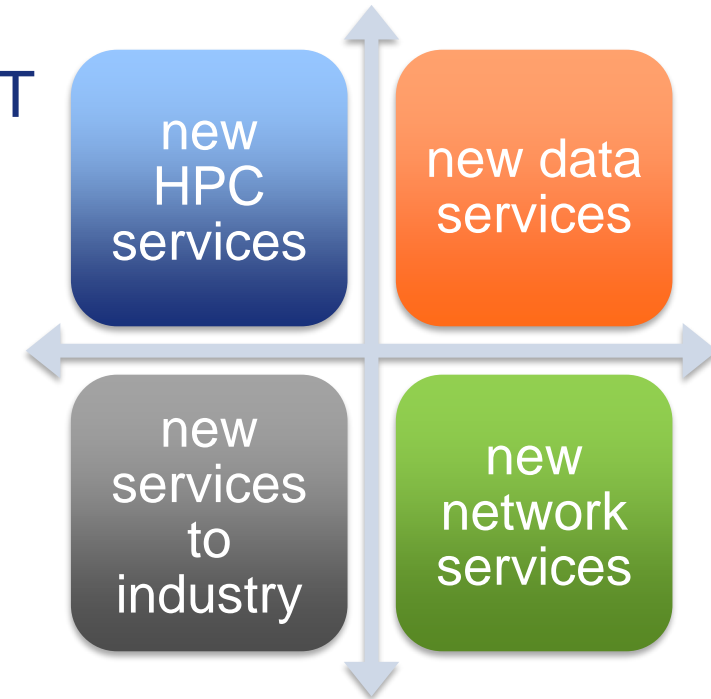
Importance of Tier-1:

- National Stepping Stone
- Data reduction at RIs
- Industry access
- Pilots

Address various needs with  
full pyramid

# Extend PRACE activities → EDI

- ▶ PRACE as main contributor to EDI with GÉANT
- ▶ Access to JU- & Tier-0-infra provided by HMs for Open R&D for science & industry
- ▶ Offer **training**, code enabling, communication, **Tier-1 for Tier-0** services provided by PRACE partners & AISBL office
- ▶ Extend services towards **industry** (SHAPE-Fortissimo), and to the **public sector**
- ▶ **Local** support across Europe



- New **extended** services provided by partners
- **EDI** as a **one-stop-shop** for all EU project/infra on HPC and data
- **EOSC** as potential vehicle to offer services to wider communities



# PRACE & EuroHPC

- ▶ EuroHPC Joint Undertaking funding instrument
  - ▶ *EC- & MS-lead initiative*
  - ▶ *Procure (pre-)exascale systems and more in Europe*
  - ▶ *Support development of European technology*
- ▶ PRACE and its partners
  - ▶ Continued PRACE 2 Programme until 2020
  - ▶ Share know-how
  - ▶ Provide services, support, and training adapted to user communities

**Stay tuned !**



# THANK YOU FOR YOUR ATTENTION

[www.prace-ri.eu](http://www.prace-ri.eu)



# Current **PRACE** Access Mechanisms

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*PRACE Managing Director*





# PRACE | access mechanisms

- ▶ Distributing resources via various access mechanisms
  - ▶ All targeting excellence in science + support to industry/SMEs
- ▶ **Project Access**
  - ▶ Tier-0 through peer-review
- ▶ **Preparatory Access**
  - ▶ Several types
- ▶ **SHAPE Programme**
  - ▶ Targeting SMEs
- ▶ **Distributed European Computing Initiative (DECI)**
  - ▶ Transnational Tier-1



# PRACE | project access

- ▶ Main access mechanism distributing Tier-0 resources
- ▶ Bi-annual **calls for proposals**
  - ▶ For a specific project; award period 1 to 3 years
  - ▶ Small share reserved for Centres of Excellence (CoE)
  - ▶ For individual researchers and (international) research groups
  - ▶ Accessible to industry for Open R&D
  - ▶ Requires to demonstrate technical feasibility of project
- ▶ **Peer-Review Process** (under continuous improvement)
  - ▶ Scientists driving the ranking across disciplines (on the ERC model)
  - ▶ Accounting for technical requirements
  - ▶ Accounting for PRACE 2 Programme settings



# PRACE | project access





# PRACE | preparatory access

Under revision

- ▶ Support users to get access to Tier-0
- ▶ Four types of preparatory access
  - ▶ Type A – Collect performance information on given system
  - ▶ Type B – Porting application
  - ▶ Type C – Porting application with PRACE efforts
  - ▶ Type D – Porting application on Tier-1 then on Tier-0 with PRACE efforts
- ▶ Lightweight access process



# PRACE | SHAPE



- ▶ SME HPC Adoption Programme in Europe
- ▶ Target SMEs willing to test how HPC supports their business case
- ▶ Calls for applications judged on :
  - ▶ Strength of business case
  - ▶ Achievability, commitment from the SME and innovation
  - ▶ Social and economic impact for society
- ▶ Increasing competitiveness & create new business opportunities
- ▶ Enable development of new products or services



# PRACE | DECI

- ▶ DECI = Distributed European Computing Initiative
  - ▶ Exchange of Tier-1 cycles between PRACE members (Optional Programme)
- ▶ Based peer review process similar to the Project Access
  - ▶ DECI Access and Allocations Local Panel (DAALP)
    - ▶ *Country providing resources to the DECI undertakes its own scientific evaluation*
  - ▶ DECI Access and Allocation Committee (DAAC)
    - ▶ *Operational committee issuing recommendations on proposals*
      - ▶ *Those which should be granted allocation and*
      - ▶ *Distribution of available resources to the successful proposals*



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