

# SURF HPML Group

Bryan Cardenas

Lars Veefkind

High Performance Machine Learning

SURF

Apply for compute access

**SURF is the collaborative organisation for IT *in Dutch education and research***



**Snellius is the Dutch  
National supercomputer  
operated by SURF.**

**The system facilitates  
scientific research**



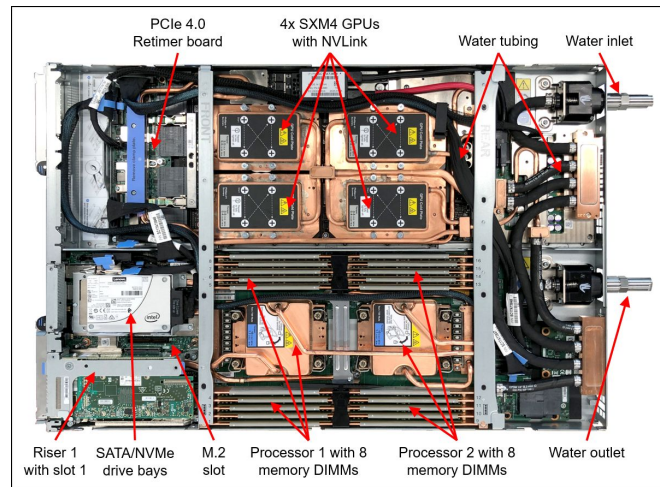
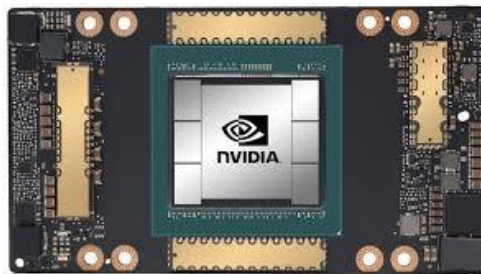
## GPU Nodes

72 × 4 × NVIDIA A100 40 GB VRAM

88 × 4 × NVIDIA H100 96 GB VRAM

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total peak performance  
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(fp32)



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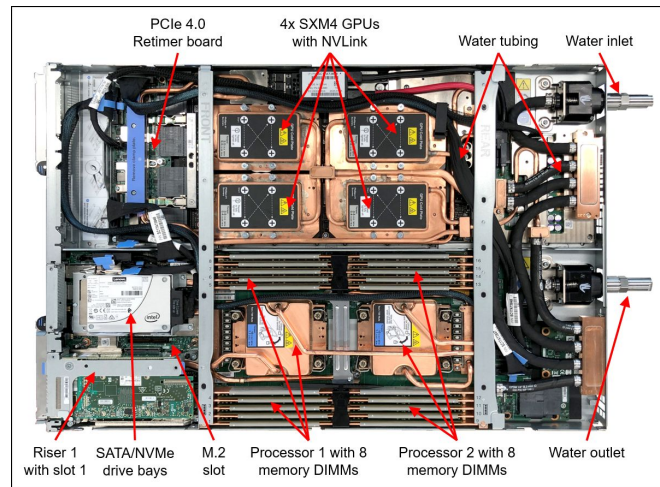
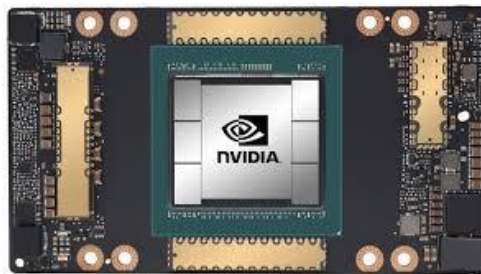
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## CPU Nodes

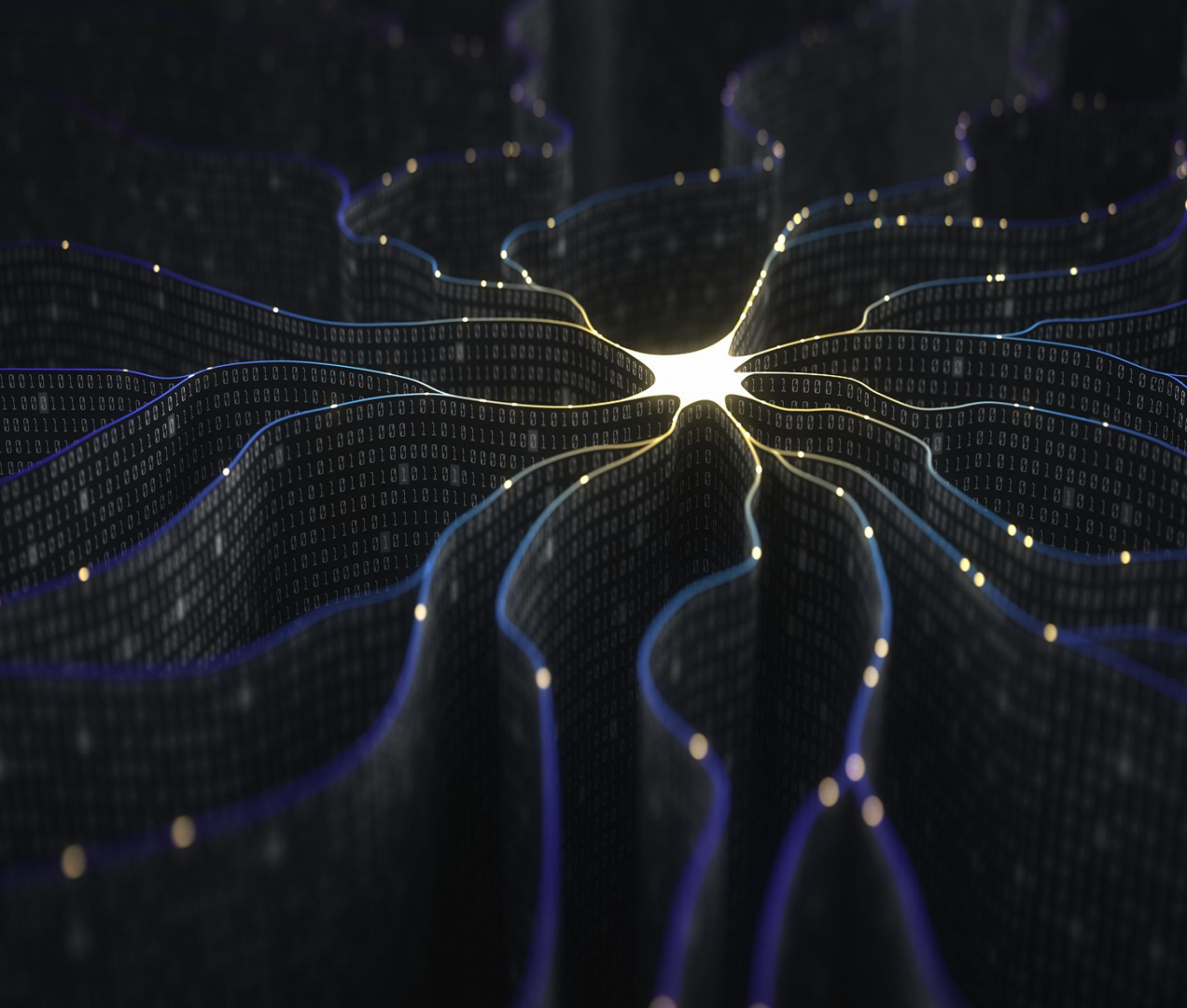
Over 1500 CPU nodes (256G-8TB RAM).







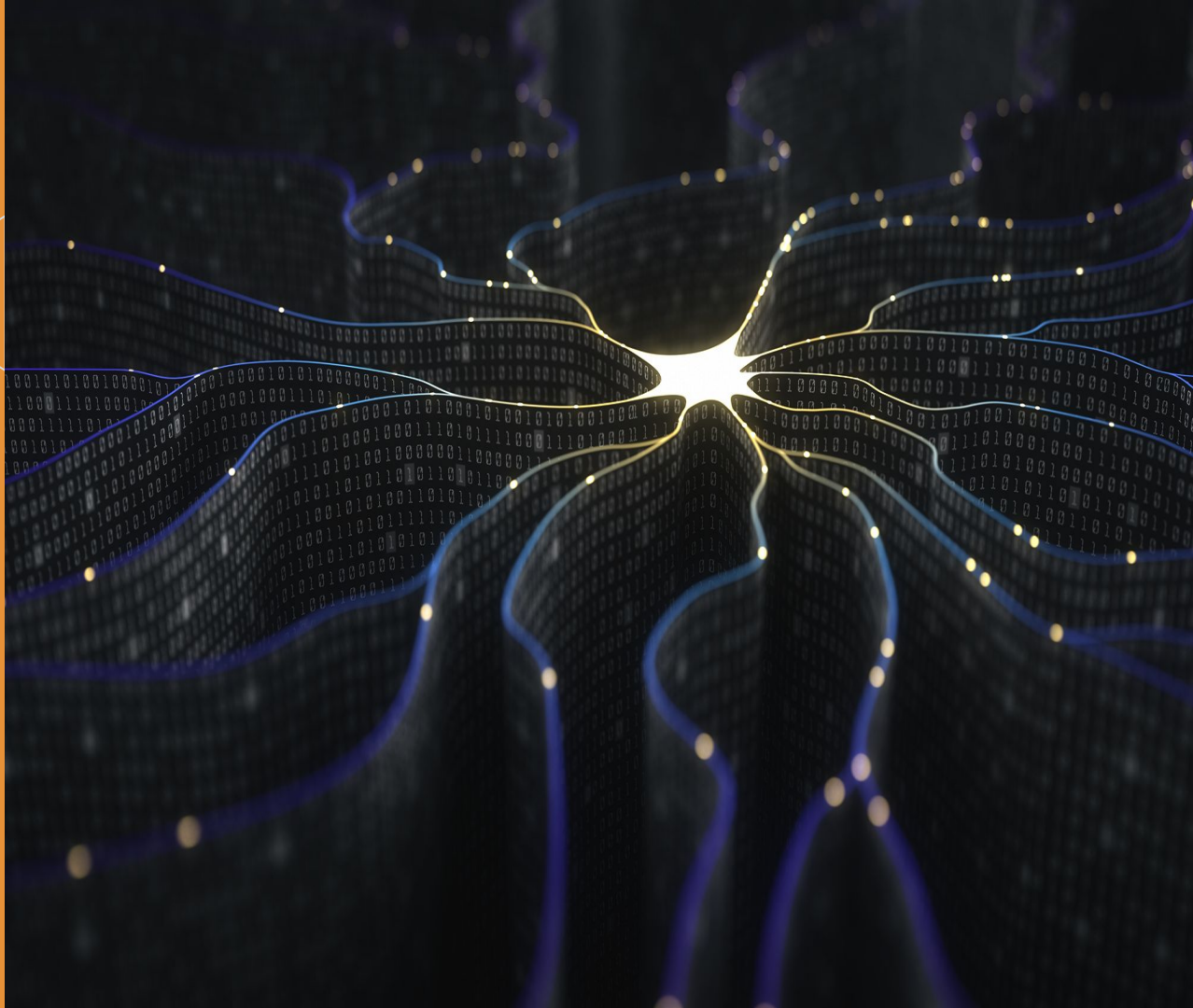
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scientific research





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scientific research

ML@SURF



The system facilitates  
scientific research



ML@SURF

Bridge the gap between cutting-edge AI  
research and adopting researchers

Improve efficiency of numerical  
simulations

ML expertise still very **expensive and  
scarce**

ML training scaleout is **not trivial**





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ML@SURF

Growing group ~15

Wide range of expertise

Bridge the gap between cutting-edge AI  
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**HPML@SURF**

**Research support and  
outreach**

**Algorithm scaling and  
efficiency**

**Algorithm design**



**HPML@SURF**

## **Research support and outreach**

Courses, bootcamps, workshops, tutorials

SC'18 & ISC19 & ISC'20 & ISC'21  
Deep Learning on Supercomputers  
and for science

Software stack deployment and  
maintenance

## **Algorithm scaling and efficiency**

## **Algorithm design**



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Collaborations with Intel, Xilinx,  
AMD, Dutch Academia & Research  
institutions

Contributions to MKL-DNN and  
MLSL, Tensorflow, Caffe, Horovod

## Algorithm design



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## Algorithm design

AI for science: all modalities

Medical AI: image analysis, NLP,  
digital histopathology

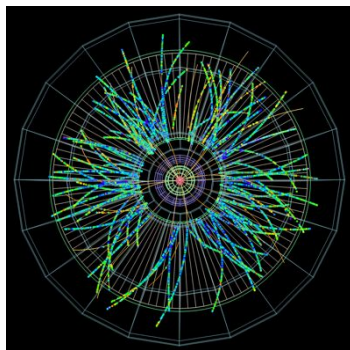
Quantum Machine Learning

XAI Multiscale workflow

Automatic ML architecture &  
pipeline discovery

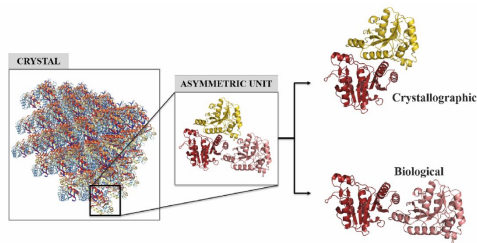


**SURF**



DL for high energy physics

**Radboud**



biological interfaces from crystal artifacts  
in biomolecular complexes

**Utrecht**



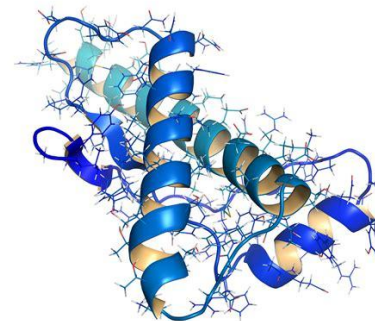
ML turbulence in weather models

**Wageningen**



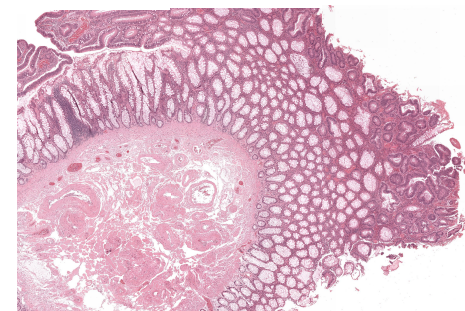
ML for accelerating planetary dynamics in  
stellar clusters

**Leiden**



Protein folding

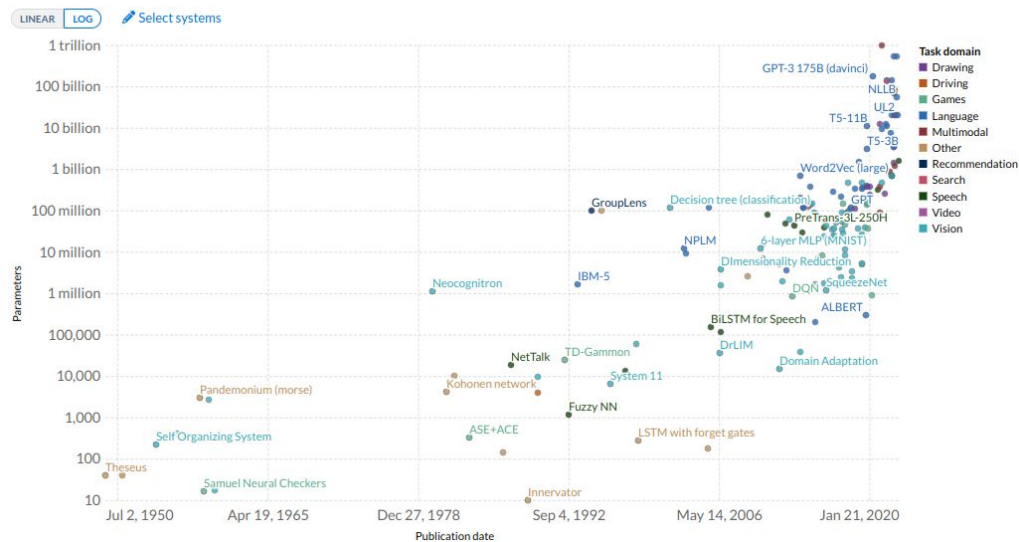
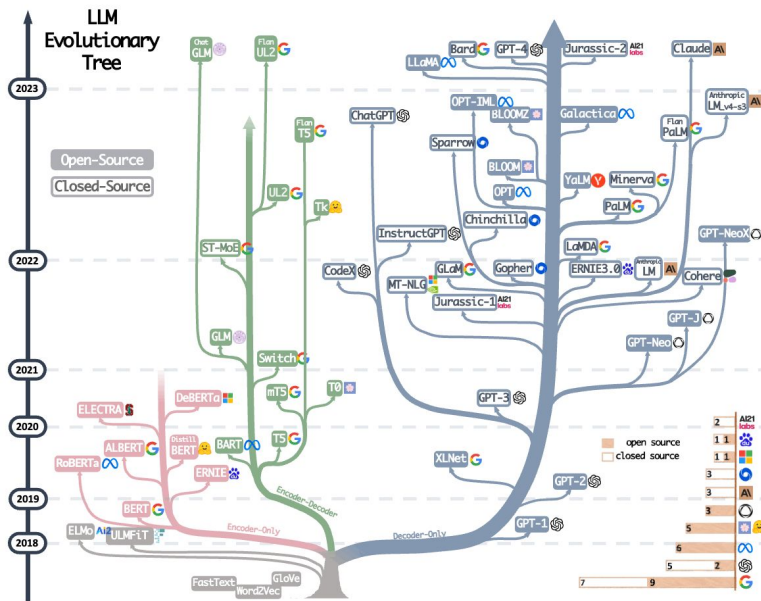
**Intel**



Multimodal analysis tools for histopathology  
clinical and research practice

**RUMC**

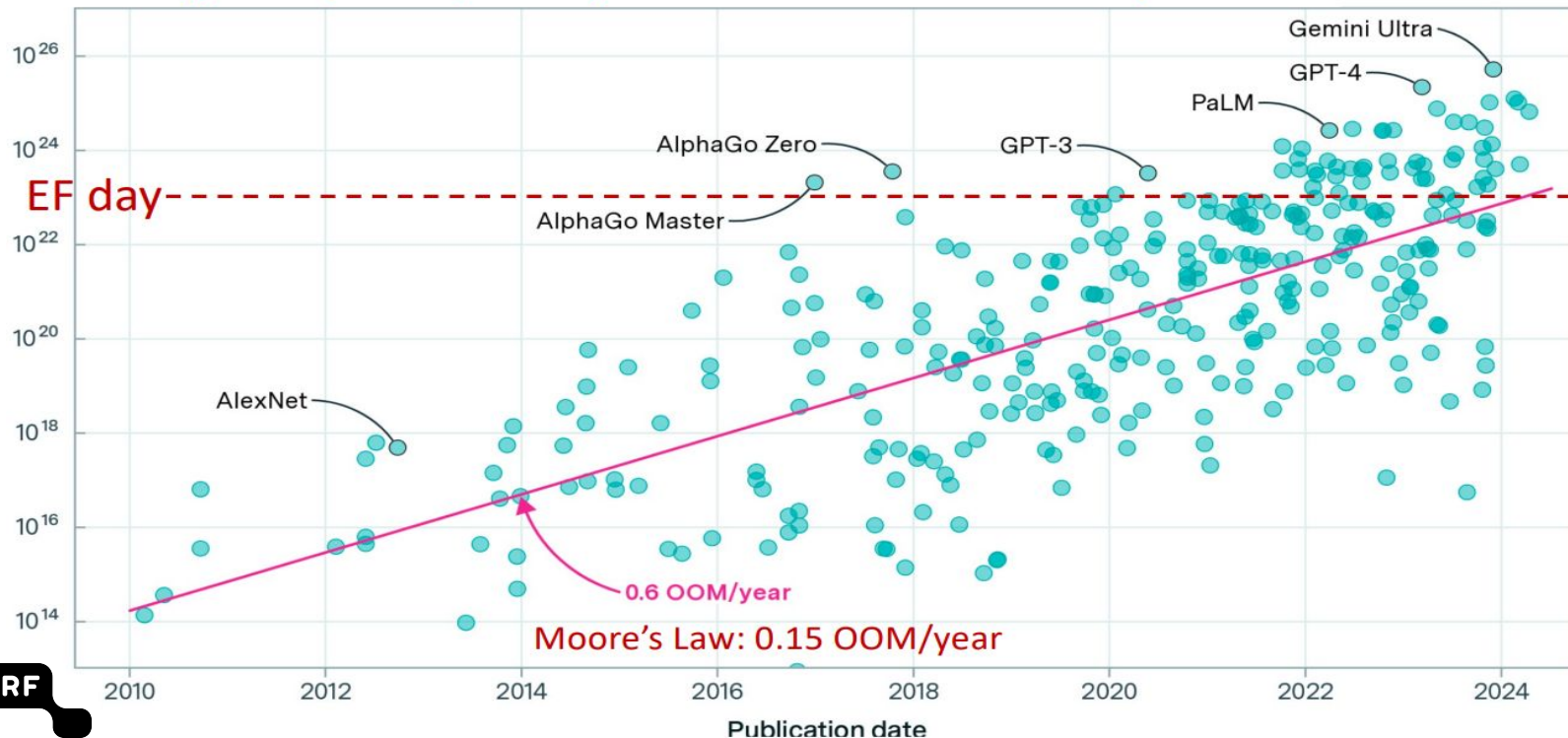
## Cambrian Explosion of ML models



# Growing Pace in OOM

## Training compute (FLOP) of notable models – Epoch AI

333 models



## 1. Small or Large NWO Grant

<https://www.surf.nl/en/research-it/apply-for-access-to-compute-services>

<https://servicedesk.surf.nl/wiki/pages/viewpage.action?pageId=30660193>

<https://servicedesk.surf.nl/wiki/display/WIKI/NWO+grants>

**Apply for consultancy hours!**

## 2. Mail us!

[bryan.cardenasguevara@surf.nl](mailto:bryan.cardenasguevara@surf.nl)

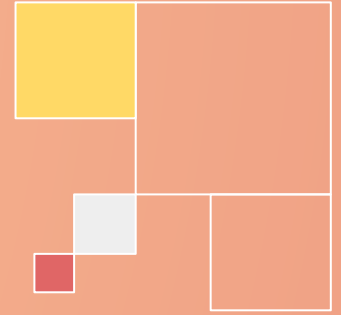
[damian.podareanu@surf.nl](mailto:damian.podareanu@surf.nl)

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<https://www.surf.nl/en/consultancy-on-it-solutions-for-researchers>





# Thank You!

