High Throughput Urgent Computing

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Project Collaborators

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Source: NASA

Source: FEMA

Source: FEMA

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High Throughput Urgent Computing

❑ Urgent computing provides immediate, cohesive access to computing resources for emergency computations

❑ Support for urgent high throughput computing environments is necessary

  ❑ Support for high throughput emergency computing applications

  ❑ Urgent cycle scavenging
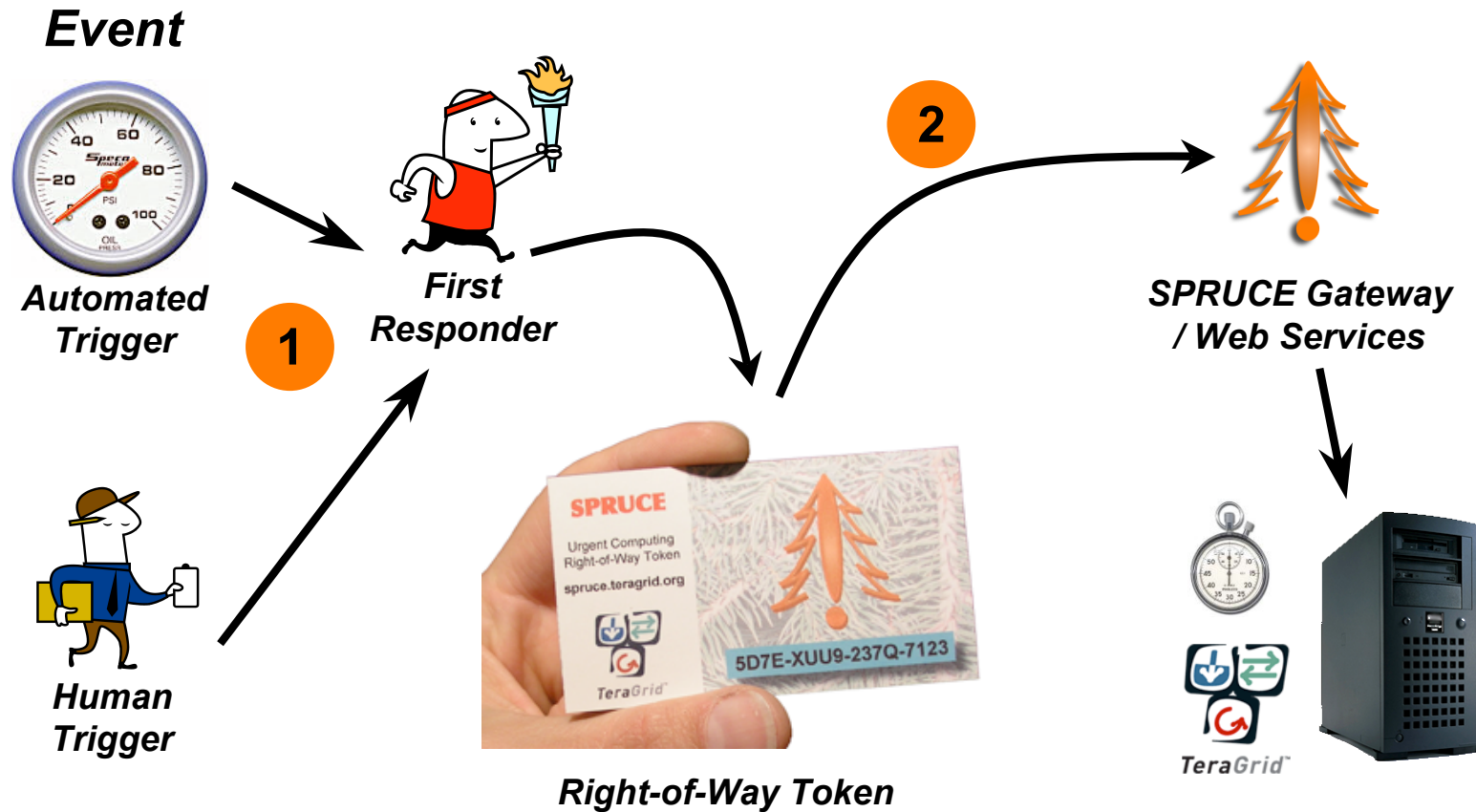
Resources for Urgent Computing Environments

	Pros	Cons
Dedicated Resources	❑ Immediate access	❑ Wasted cycles ❑ Cost
Shared Resources	❑ Reuse existing resources ❑ Increased utilization	❑ Resource contention ❑ Scheduling, authorization

SPRUCE

- Special PRiority Urgent Computing Environment (SPRUCE)
    - TeraGrid Science Gateway
    - http://spruce.teragrid.org

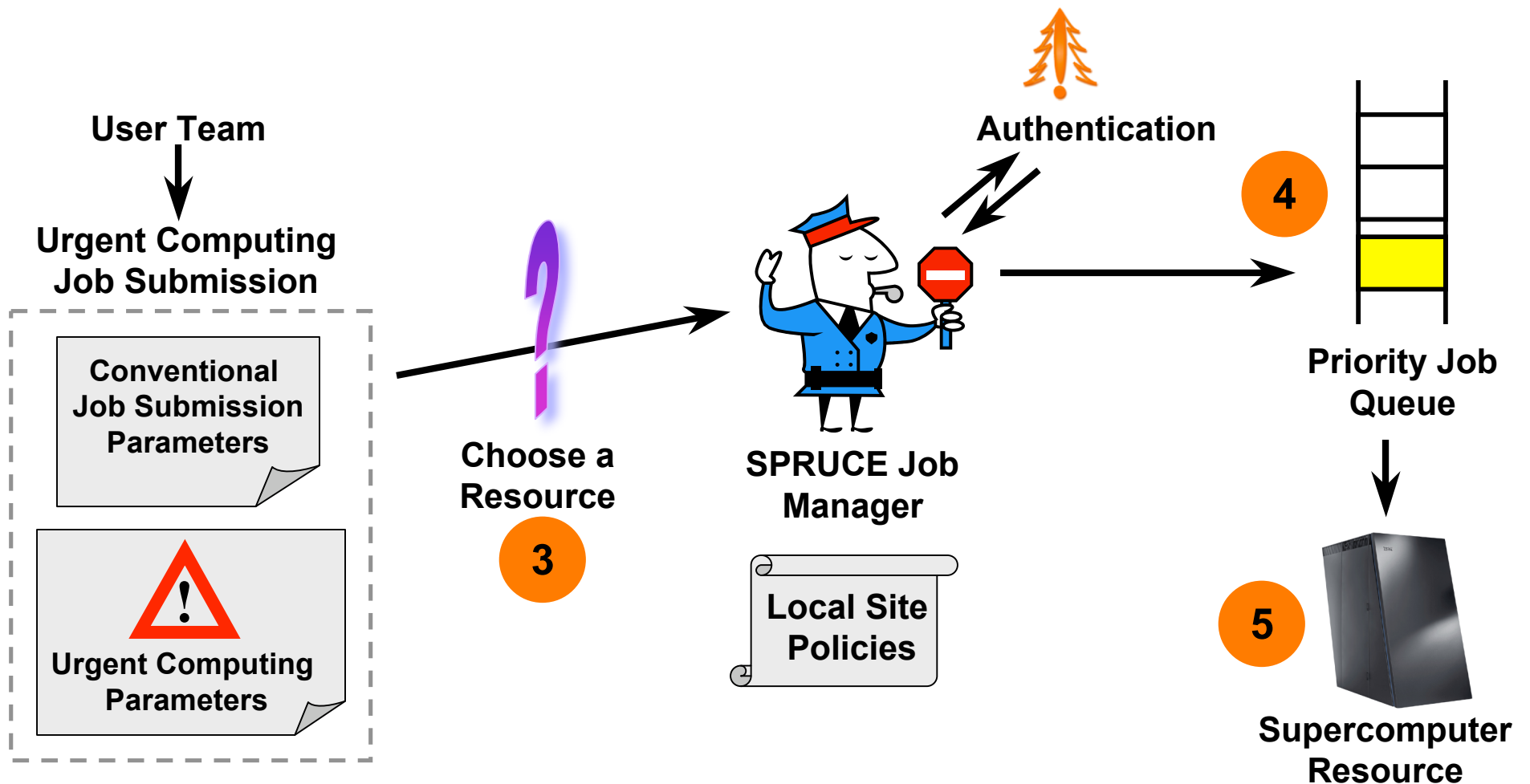- **GOAL: Provide cohesive urgent computing infrastructure for emergency computations**
    - Authorization
    - Resource Selection
    - Resource Allocation

SPRUCE Architecture Overview (1 / 2)

Event

Automated Trigger

Human Trigger

1

First Responder

2

Right-of-Way Token

SPRUCE Gateway / Web Services

Source: Pete Beckman, 'SPRUCE: An Infrastructure for Urgent Computing'

SPRUCE Architecture Overview (2 / 2)

User Team

Urgent Computing Job Submission

Conventional Job Submission Parameters

Urgent Computing Parameters

Choose a Resource

3

Authentication

SPRUCE Job Manager

Local Site Policies

4

Priority Job Queue

5

Supercomputer Resource

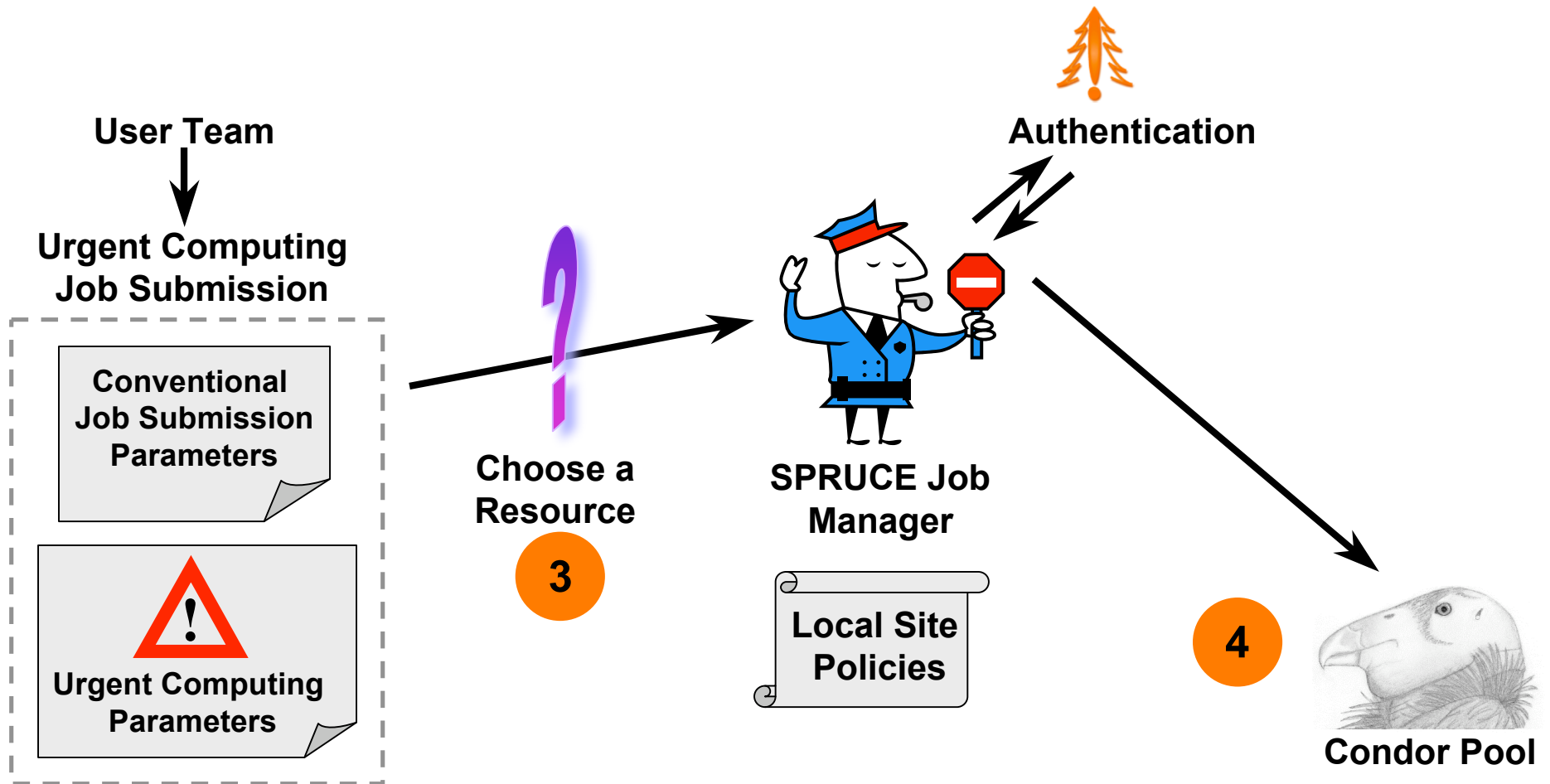Source: Pete Beckman, 'SPRUCE: An Infrastructure for Urgent Computing'

SPRUCE Resources

❑ Deployed on TeraGrid resources at IU, NCSA, NCAR, Purdue, TACC, SDSC, UC/ANL

❑ Supported Resource Managers
  ❑ PBS
  ❑ PBS Pro
  ❑ LSF
  ❑ SGE
  ❑ LoadLeveler
  ❑ Cobalt

❑ Local and Grid resource managers supported

SPRUCE and Condor

User Team

Urgent Computing Job Submission

Conventional Job Submission Parameters

Urgent Computing Parameters

?

Choose a Resource

3

SPRUCE Job Manager

Local Site Policies

Authentication

4

Condor Pool

Adapted from Pete Beckman, 'SPRUCE: An Infrastructure for Urgent Computing'

SPRUCE / Condor Integration

- ❑ Added support for urgent computing ClassAds
    - ❑ SPRUCE_URGENCY
    - ❑ SPRUCE_TOKEN_VALID
    - ❑ SPRUCE_TOKEN_VALID_CHECK_TIME
- ❑ Modifications to the Condor schedd that support identifying SPRUCE jobs
- ❑ SPRUCE Grid ASCII Helper Protocol (GAHP) Server
    - ❑ Asynchronously invoke SPRUCE Web service operations
    - ❑ GAHP calls integrated into the Condor schedd

SPRUCE / Condor Integration
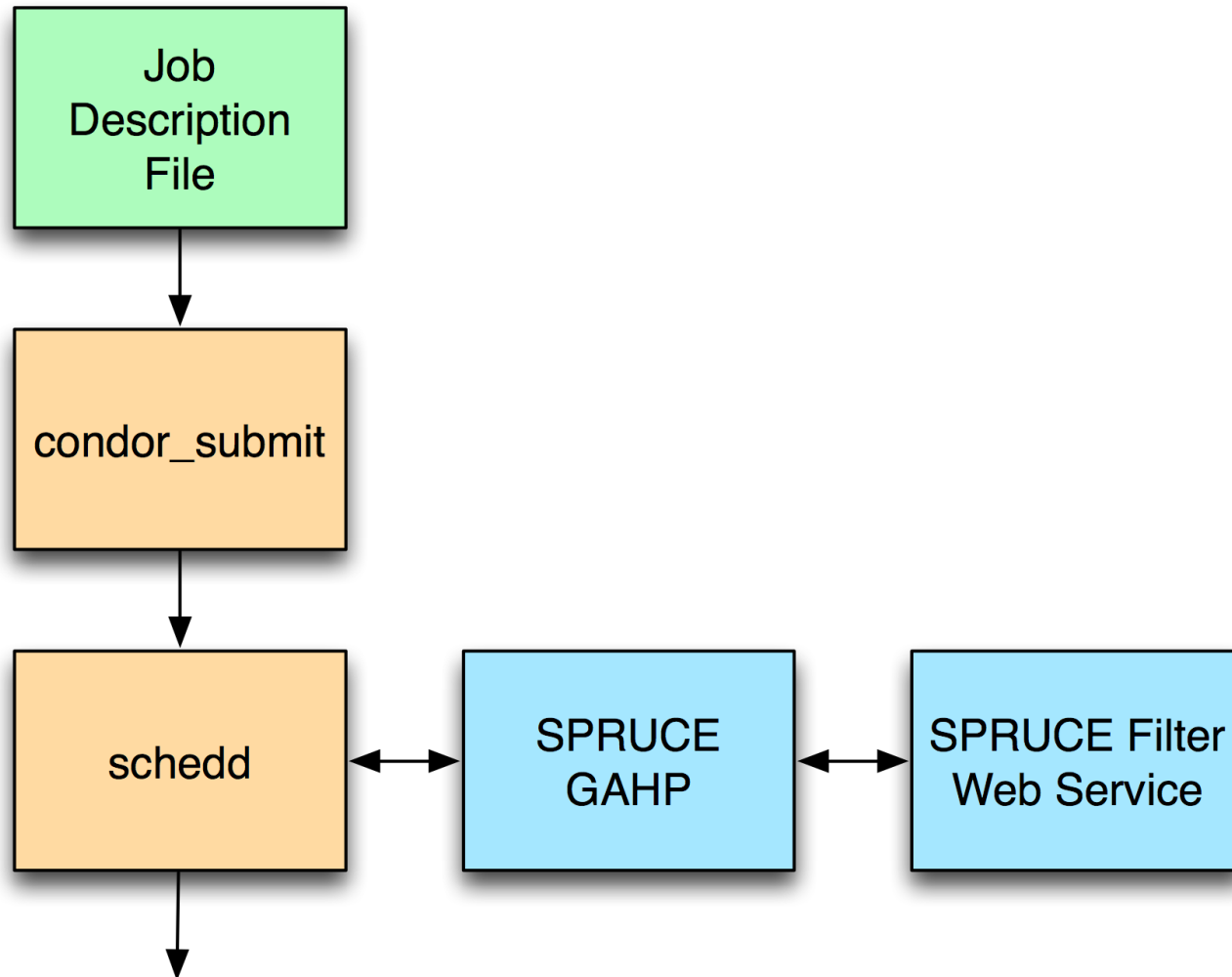
SPRUCE / Condor Integration

❑ SPRUCE provides an authorization mechanism for access to Condor resources

  ❑ "Right-of-Way" access to Condor resources

  ❑ Same authorization infrastructure for supercomputer and Grid resource access

❑ Leverage existing Condor features to enhance scheduling policies

  ❑ Job ranking / suspension / preemption

  ❑ Site administrators define local scheduling policies

SPRUCE / Condor Status

❑ Prototype complete August, 2007

  ❑ Demonstrated urgent authorization and scheduling capabilities

  ❑ Deployed and tested on equipment at the University of Colorado

❑ Currently revising the prototype for a stable software release

  ❑ Condor 7.0 support

  ❑ Final software development iteration before official release

  ❑ Evaluation of SPRUCE-related software integrated into larger Condor pools

Future Work

- ❑ High throughput support for urgent computing applications
    - ❑ SURA SCOOP CH3D Grid Appliance

- ❑ Many additional evaluation tasks
    - ❑ Application requirements
    - ❑ Security
    - ❑ Deadline scheduling / response time
    - ❑ Reliability / fault tolerance analysis
    - ❑ Data management

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Questions?

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