digitaldispatcher

Intelligent Platform for Real-Time Allocation of Resources

Powerful AI Technology for Digital Transformation

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Unique Features

The platform comprises a *swarm of intelligent real-time schedulers* that cooperate or compete as they schedule concurrently:

- Human resources
- Physical resources
- Financial resources
- Knowledge resources

Constituent schedulers can be used individually or in any combination.

Examples of scheduling financial and knowledge resources:

- schedules payments of invoices and allocates working capital to business processes to optimize cashflow
- Extracts knowledge from data in real-time and stores it in a knowledgebase, to be allocated to business processes, as required

The platform can be customized for a variety of applications such as

- *Delivering goods* – strategic planning, coordinating and scheduling supply chains, warehousing, manufacturing, purchasing, investment, cash flow
- *Delivering services* – digitizing insurance, managing risks, scheduling resources for education and training
- *Transport* - scheduling flights, pilots, ground staff, taxis, railways, seagoing tankers, road transport
- *Space applications* - scheduling satellites, delivery of cargo to the international space station
- *Health care* - scheduling appointments, nurses, protective equipment, vaccination, operating theatres, ambulances
- *Smart City* – strategic planning, coordinating and scheduling various services to citizens and visitors

Unique Features (cont.)

The System features powerful Artificial Intelligence (AI) which enables it

- To instantly detect any unpredictable change in demand, failure of a resource, fraud or electronic attack
- To rapidly identify resources affected by the detected disruptive event
- Within seconds, to neutralize the disruption by rescheduling *only the affected parts* of the business process

Because the System reschedules only the affected part of a business process when a disruption occurs (*which is normally a fraction of the whole process*)

- the business process is not interrupted while rescheduling of affected resources takes place
- adaptation is so rapid that it can be completed between two consecutive disruptive events

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Benefits

Uniqueness

There is no system on the market that can compete in terms of coverage, intelligence and the speed of adaptation to changes.

Scope

Covers all resource allocation problems in a business or administration.

Profitability

Reduces operational costs by at least 20%.

Return on investment

Typically repays for itself in 6 months.

Order fulfilment

Ensures that all orders are fulfilled on time and cost.

Transparency

Ensures costing transparency by calculating costs of every individual resource deployment.

Productivity

Improves substantially productivity by replacing human resources by AI and by improving utilisation of physical and financial resources.

The System operates 24 hours a day, 7 days a week, continuously updating allocation schedules in reaction to disruptive events.

Self-improvement

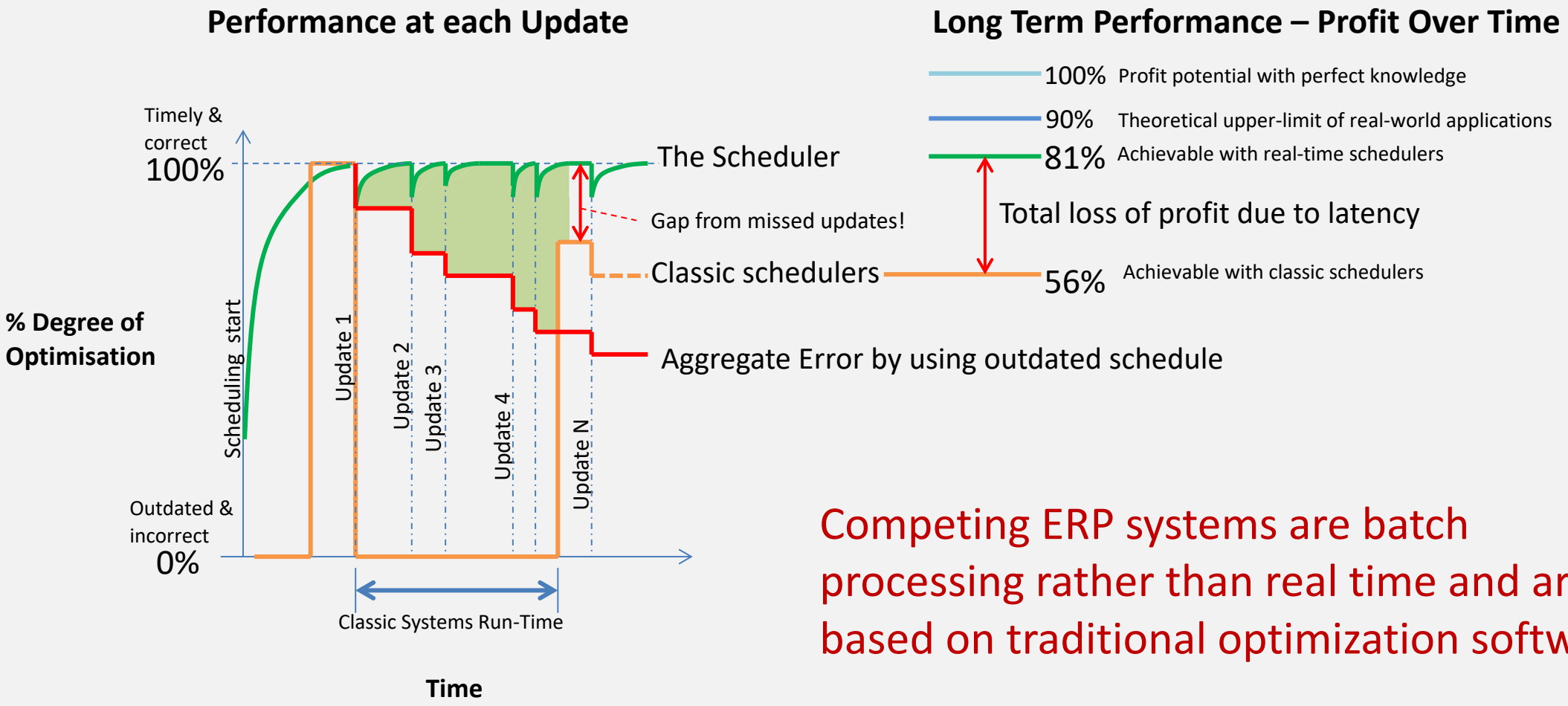
In intervals between disruptions, the System autonomously analyses business process performance and searches for ways to improve quality of the service.

Future proof

Plays the key roll in digital transformation.

Potentially, the System can replace up to 50% of current jobs. However, it creates new jobs related to digital transformation, usually in startups.

Benefits of Intelligent Real-Time Allocation



Competing ERP systems are batch processing rather than real time and are based on traditional optimization software

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Architecture

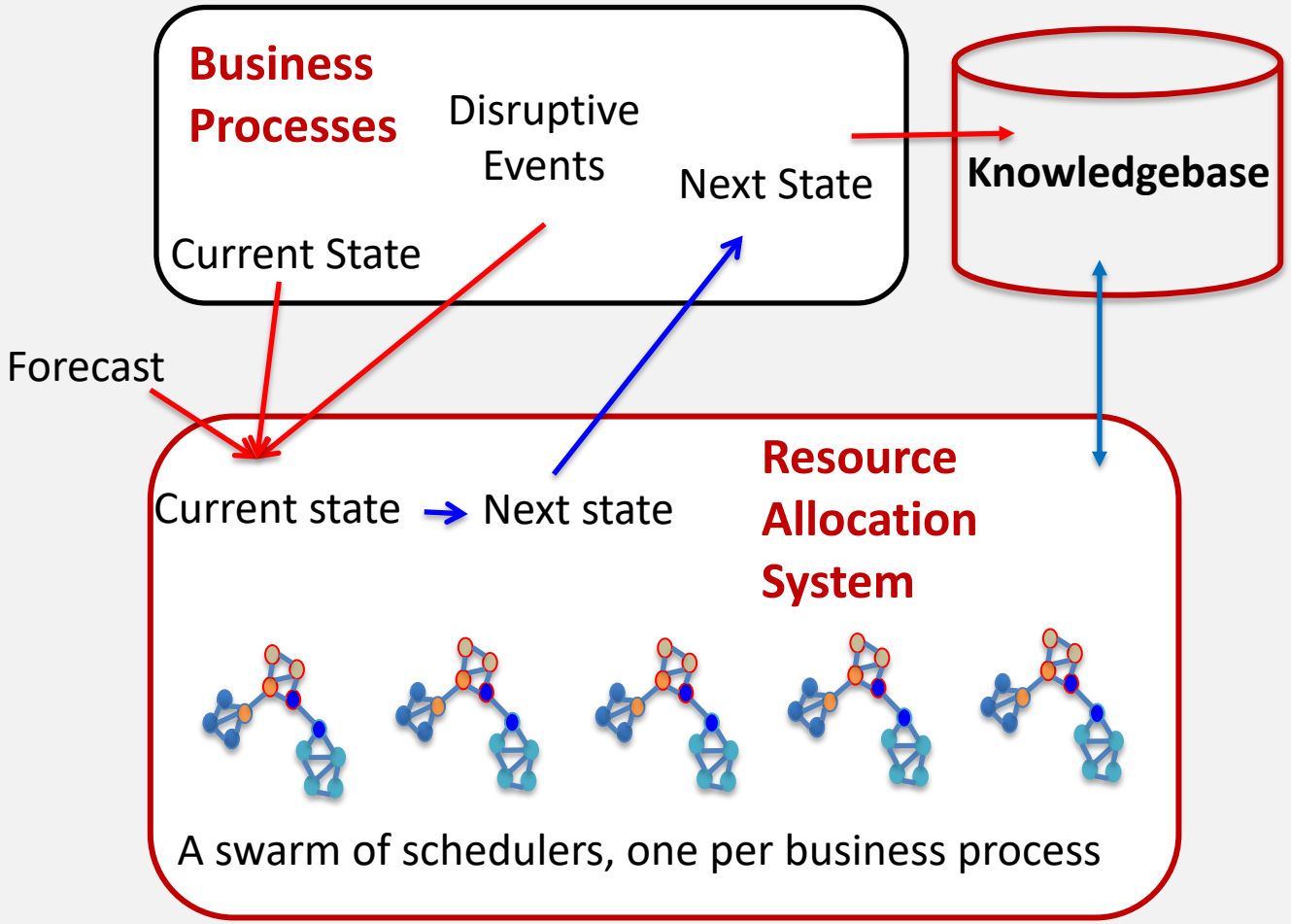
The system consists of a swarm of real-time schedulers, each scheduling a business process.

Each scheduler is a complex adaptive system consisting of digital agents engaged in intense interaction.

Demand Agents negotiate with Resource Agents how best to allocate resources to demands, based on demand forecasts and the current state of the appropriate business process, reacting rapidly to any disruptive event.

Agents consult knowledgebase.

Results are conveyed to the business process that is being scheduled.



Intelligent Real-Time Scheduler

Space Applications

Intelligent Real-Time Scheduler for Space Logistics

Every one of 50 or so flights to **International Space Station** (ISS) costs at least $1.4 billion.

The System manages mission critical delivery of water, fuel, air, research material and food and medicine for astronauts to ISS.

It controls docking and unloading in gravitation-less environment, manages stocks at the Station and schedules space research activities.

It rapidly reschedules resources if human error occurs, demand changes, or a resource (rocket, spacecraft, station) fails.
The system is in regular use.

The System provides synchronized strategic, tactical and operational planning of flights.

Intelligent Real-Time Scheduler for a Swarm of Satellites

A swarm of small commercial satellites can be hired for observation tasks.
If the number and frequency of orders is small distribution of tasks can be done by an earth-based centralized control system.
If it is high, an intelligent real-time scheduler must be used.
A digital agent is assigned to every task and every satellite. Task agents negotiate with satellite agents how to assign tasks to satellites.

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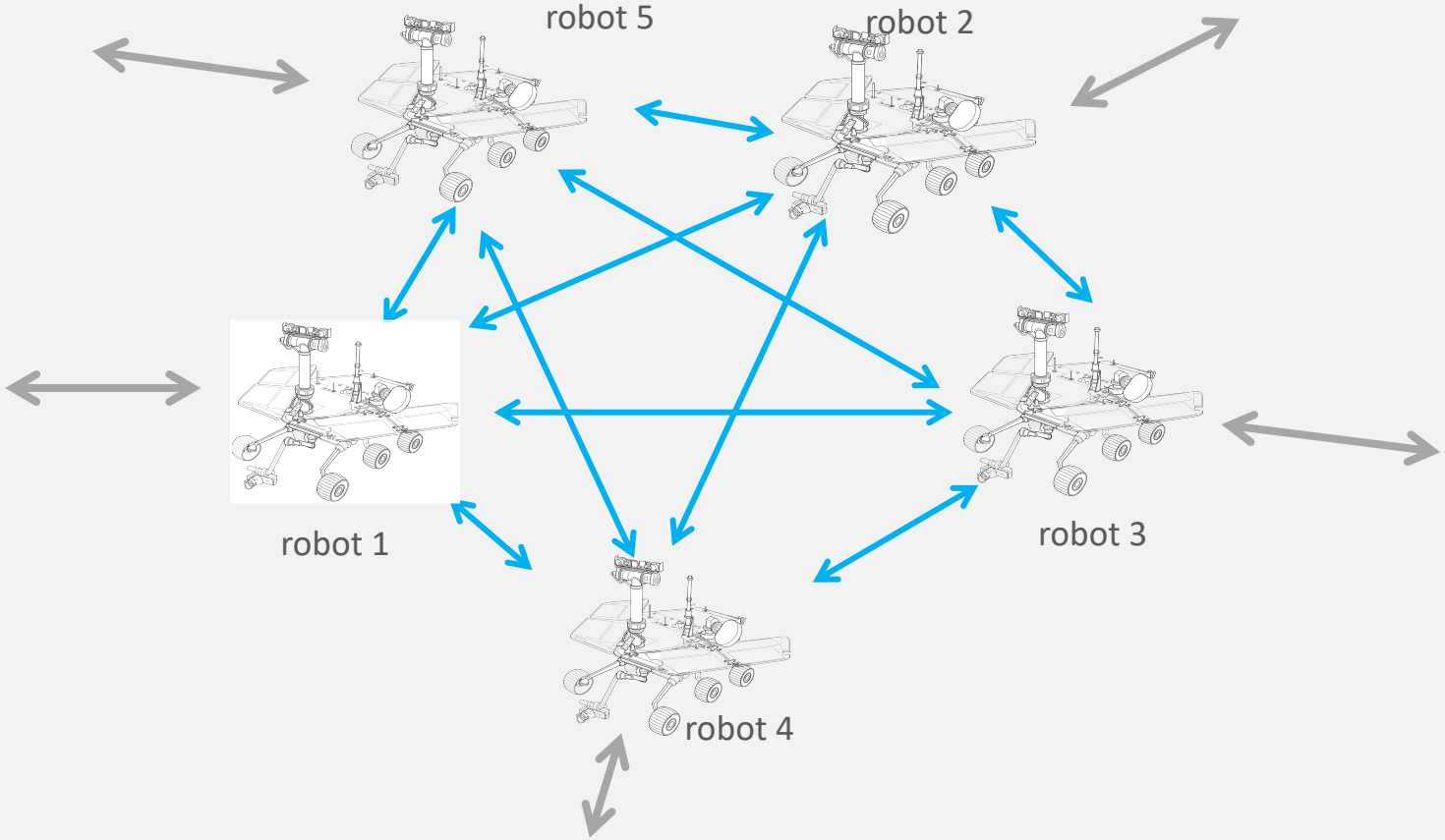
Intelligent Real-Time Scheduler for Family of Space Robots

An early robot sent to planet Mars stopped working after a while because its solar cells were covered with space dust.

To prevent such disasters, the System was customized to control a family of 5 space robots that were designed to share exploration work, clean each other's solar cells and even rescue a member of the family if it falls into a Mars canyon.



The design was never implemented. The next single robot sent to the planet fell into a canyon as it landed and was never recovered.

Intelligent Real-Time Scheduler

Transport Applications

Intelligent Real-Time Scheduler for Taxis

The client operates 2,000 taxis (minicabs) in London.

- More than 13,000 orders per day.
- More than 1,500 orders per hour (2 orders per second) during rush hours.
- Guaranteed pick up of clients within 15 minutes.
- A wide variety of types of vehicles (normal, with children seats, for deliveries , for wheelchairs).

The System allocates minicabs to passengers considering driver preferences, which it learns while operating, achieving:

- 2% reduction in lost orders.
- 22.5% reduction of Idle runs.
- 5% increase in fleet utilisation.
- 3 times reduction in delayed pick-ups.
- Return on Investment in 2 months.

Intelligent Real-Time Scheduler for Car Rentals

The client is the European operation of one of the largest rent-a-car companies in the world.

The System allocates, over the UK territory,

- cars to clients
- drivers to cars for sequences of operations such as delivering & washing cars
- drivers to drivers, to take them to collect a car or to return them to base

It rapidly reschedules cars/drivers in cases of

- no-shows
- human errors (as small as misplacing mobile phones)
- delays or cancellations

Intelligent Real-Time Scheduler for Trucks

The UK client runs a highly complex logistic operation:

- 4000 transportation instructions
- 200 trucks
- transporting to 600 different locations
- 3 cross-docks
- 4 secure trailer swapping locations

The System

- optimizes loading of trucks/trailers by considering preferred sequences of loading and unloading
- ensures that loaded cargo is as close as possible to truck capacity
- optimizes routing
- Learns and respects preferences of clients and drivers

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Intelligent Real-Time Scheduler for Seagoing Tankers

The client is a London-based company managing 10% of the total seagoing tanker capacity in the world.

- tankers of 300,000 tons
- 500 cargos per year
- voyage costs £1million per 45 days
- typical revenue £2.6million for a voyage Gulf to US
- No room for mistakes in scheduling such high value voyages

The System

- allocates tankers to demands respecting preferences of clients and considering frequent large changes in transportation fees
- manages queuing before entering Panama canal
- manages loading/unloading in ports and canals
- Rapidly responds to unpredictable disruptive events

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Intelligent Real-Time Scheduler

Supply Chain Applications

Intelligent Real-Time Scheduler for Supply Chains

LEGO has one of the largest global supply networks with over 50,000 retail outlets.

A pilot intelligent real-time scheduler has been developed and implemented achieving:

- reduction in lost sales from 40% to 16%
- increase in the service level from 66% to 86%
- increase in profitability from 56% to 81%

Coca Cola Germany produces and distributes its products to a very large number of outlets across Germany.

The System was customized for client's use as a subscription service.

In the first month of operation, it reduced delivery costs by 20%.

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Intelligent Adaptive Resource Manager

Manufacturing Applications

Intelligent Real-Time Schedulers for Aircraft Production

A prototype System was designed for planning aircraft production for clients in Germany and Russia.

It schedules supplies of sub-assemblies as well as the main production line, identifying instantly any disruption and rescheduling affected machine-tools or robots without interrupting production.

A design checking tool, based on the System, was used to identify clashes in a design of Airbus wings.

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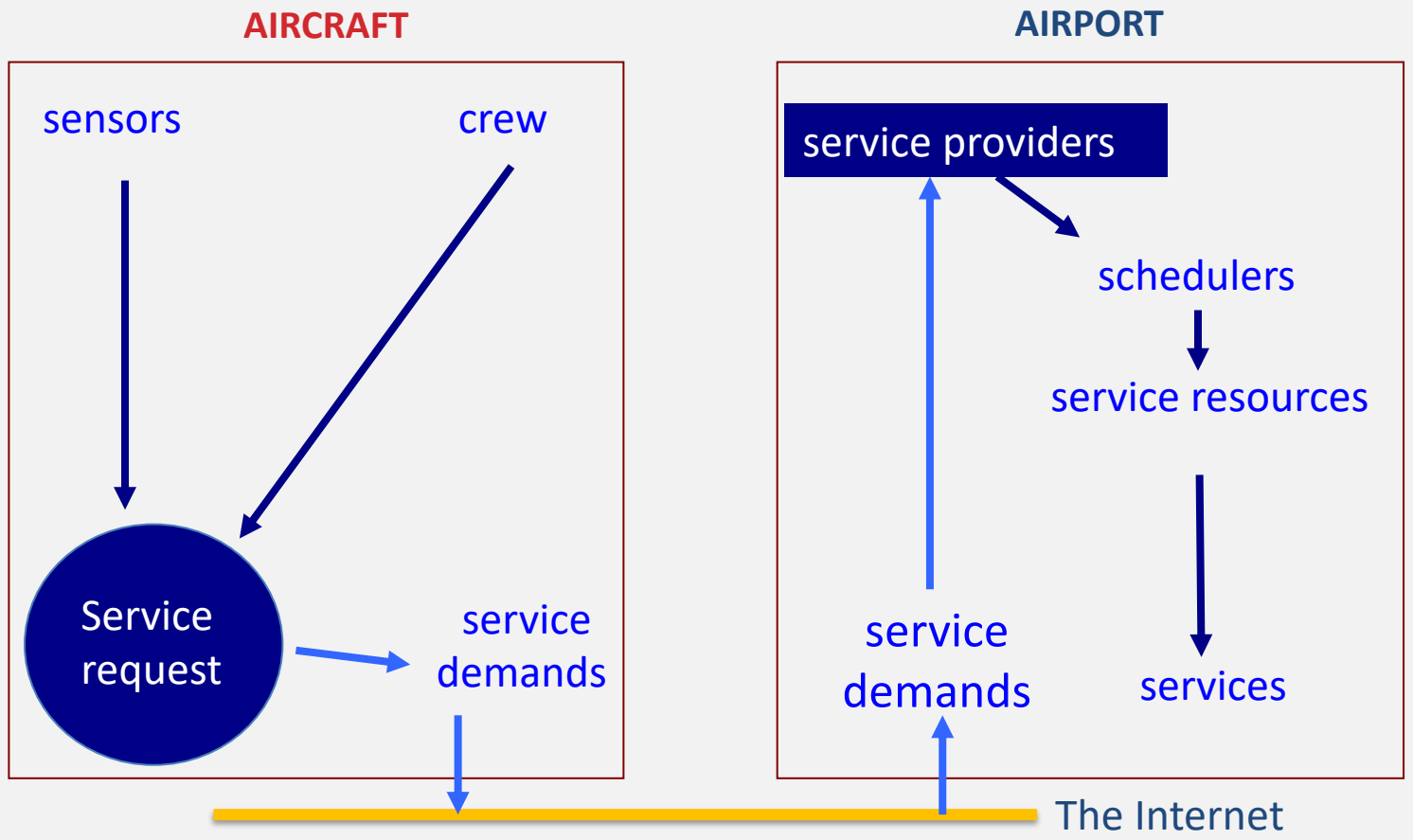
Intelligent Real-Time Scheduler
the Internet of Things Applications

Intelligent Real-Time Scheduler for Aircraft Servicing

Advanced aircraft designs envisage a comprehensive set of sensors reporting irregularities and faults.
As aircraft flies, reports from sensors are combined with crew reports and sent over the internet to the airport at which aircraft is due to land.
At the airport, the System identifies repairs that need to be done and allocates servicing engineers and required tools and materials.
Instructions are sent to personal electronic tags built in engineer's overalls and to robots servicing relevant stores.



Deliveries are directed to the landing slot if the repair is small, or to a workshop.

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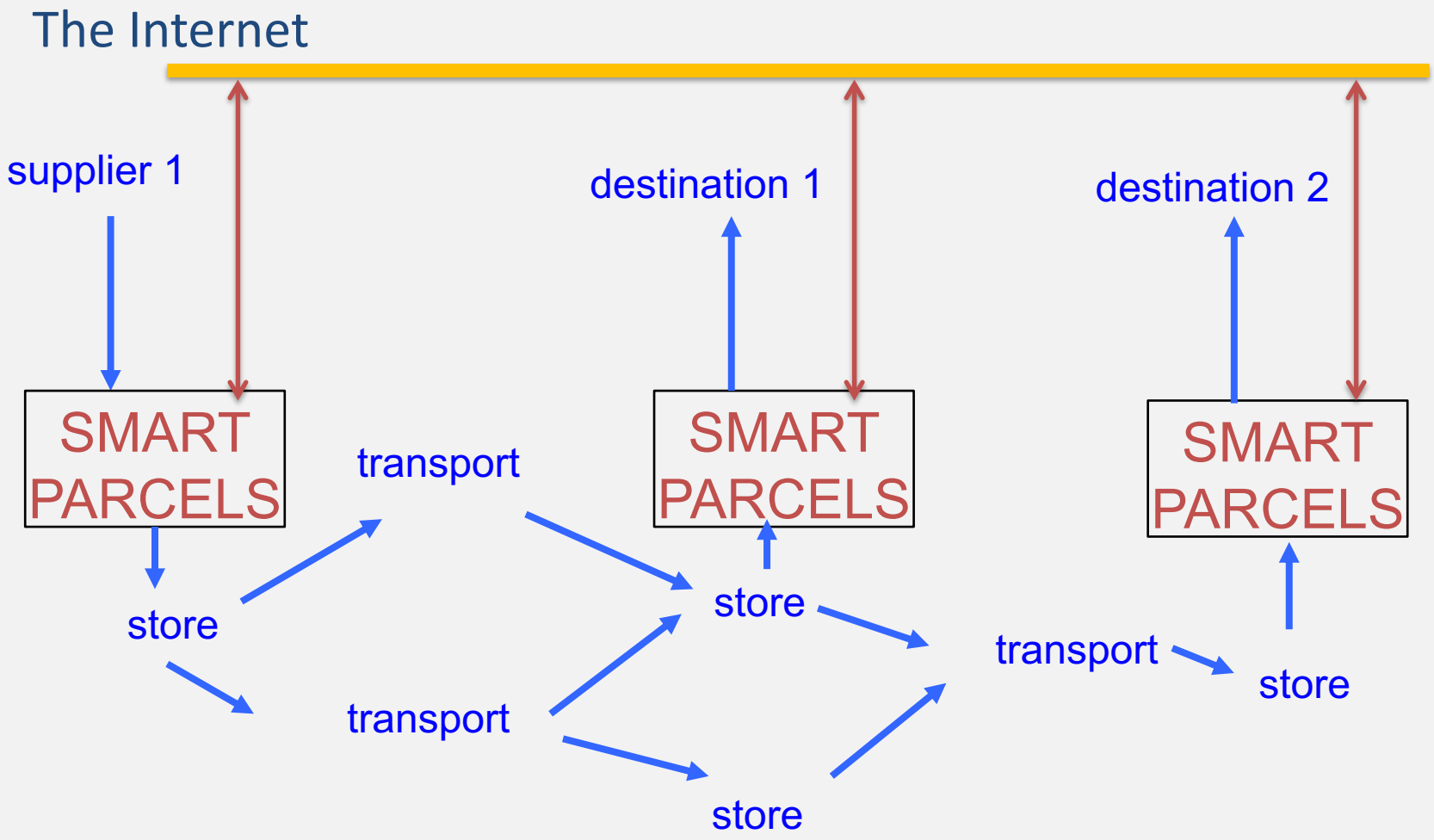
Intelligent Real-Time Scheduler for Smart Parcels

Smart electronic tags attached to parcels enable suppliers to instruct parcels over the internet where to travel and how much they are allowed to pay for transport and storage.

Parcels send their travelling plans to robots servicing stores and loading transport (cargo planes, trucks, trollies).

The System allocates parcels to stores and instructs robots to load parcels into transport, based on destinations and timetables stored in smart tags attached to parcels.



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Intelligent Real-Time Scheduler

Engineering Applications

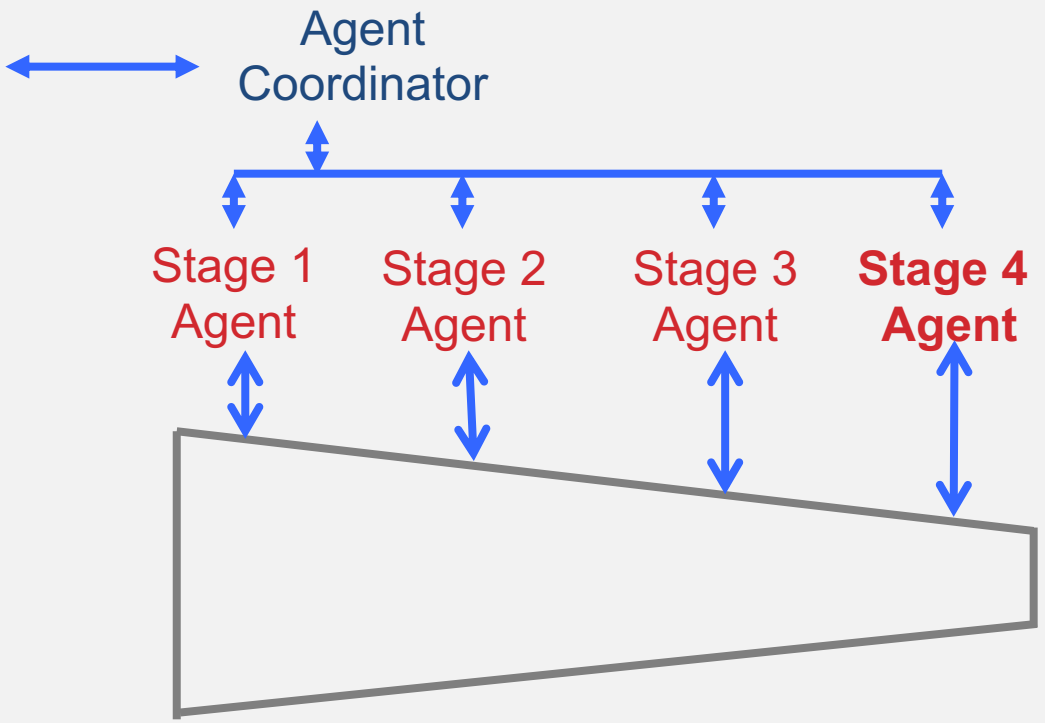
Intelligent Real-Time Controller for Variable Geometry Compressors

In long gas pipelines, where the gas flow is driven by a compressor, sudden switching on or off the load may cause pressure shocks.

To prevent the damage to compressors, large compressors are designed with variable geometry; the flow of gas through the compressor then can be controlled by adjusting geometry of stator blades.

The System was customised to control positions of stator blades to

- provide optimal flow of gas through a compressor for different loads
- to maximise the flow when pressure shocks are detected.



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