IMPACT PROPAGATION IN AIRPORT SYSTEMS

ESORICS 2020 CPS4CIP workshop

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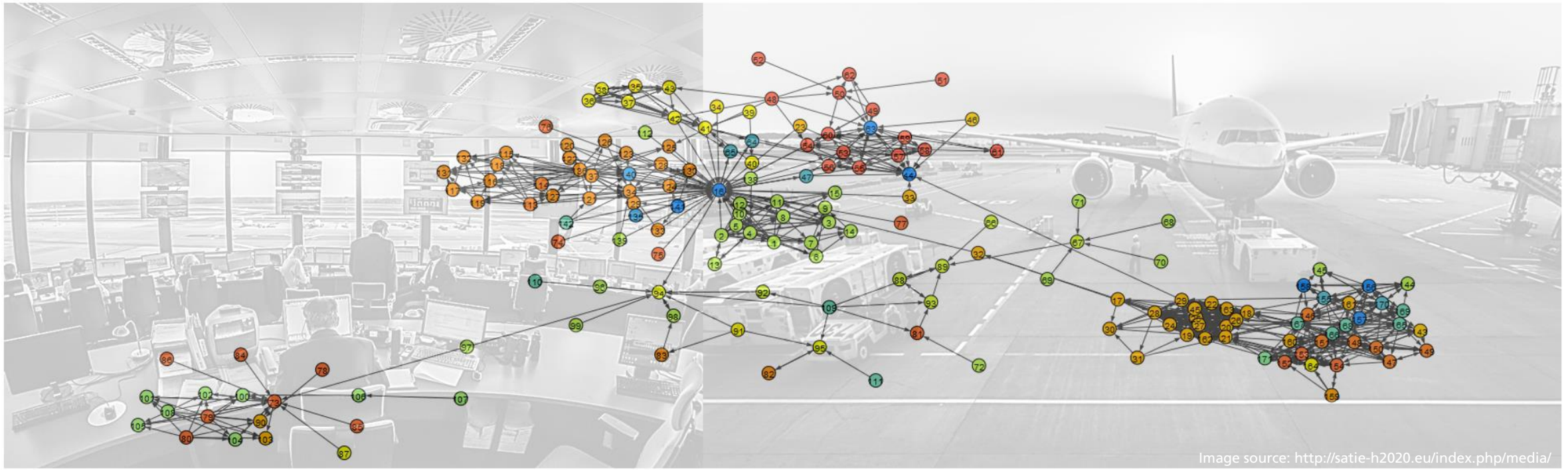
SATIE
Security of Air Transport Infrastructure of Europe



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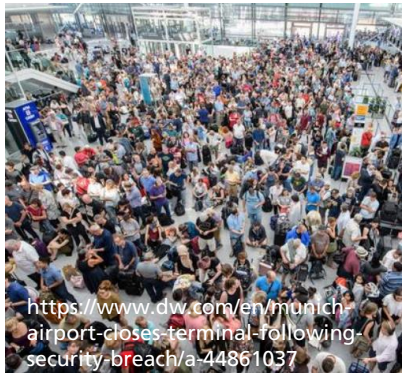
SATIE scenarios

Scenario	# 1	# 2	# 3	# 4	# 5
Systems attacked	Flight Information Display System (FIDS), Public Announcement (PA) system	Access control (AC) system	Airport Operation Data Base (AODB), Information and electrical system	Baggage handling system (BHS)	Air traffic management (ATM)
Effect	Confusion, evacuation, possible physical attack	Unauthorized access to secured areas, possible physical attack	Communication interruption, false information, black out	Manipulated baggage destination	Ground movement conflicts
	https://www.bbc.com/news/uk-england-sussex-45247499	 https://www.dw.com/en/munich-airport-closes-terminal-following-security-breach/a-44861037	https://jalopnik.com/power-outage-shuts-down-americas-busiest-airport-1821373869	https://www.thesun.co.uk/travel/9570402/heathrow-airport-chaos-baggage/	https://news4sanantonio.com/news/local/gallery/two-airplanes-collided-at-san-antonio-airport#photo-1

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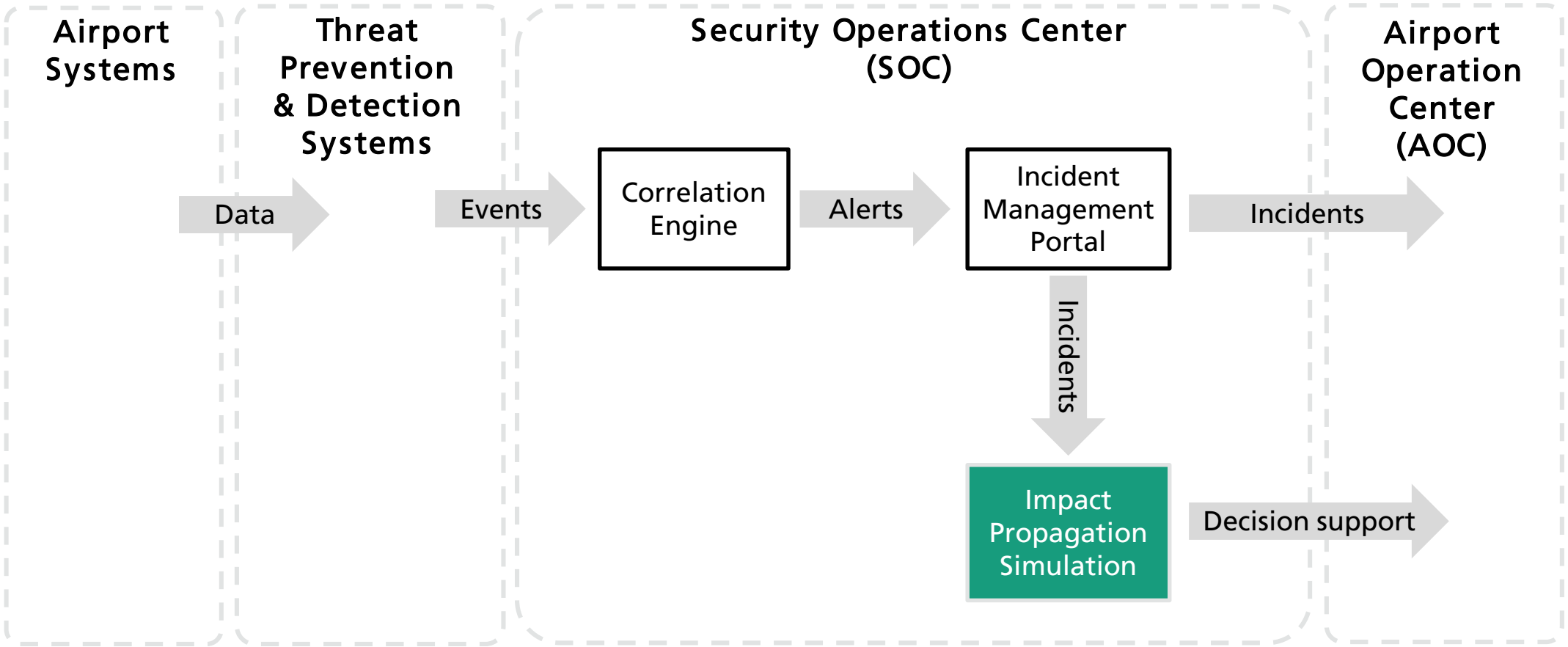
Section of the SATIE toolkit



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Impact Propagation Simulation (IPS)

Hybrid model

Airport assets

Propagation rules

Network model

Performance indicators

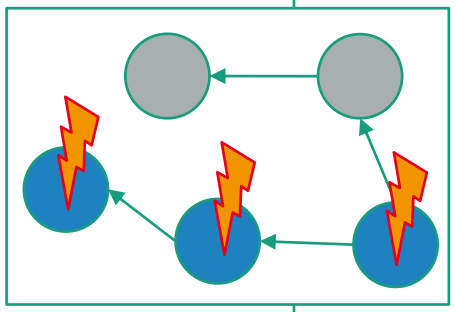
Common assets
Mitigation measures

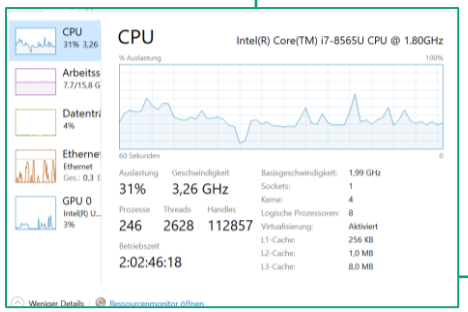
Passenger movement

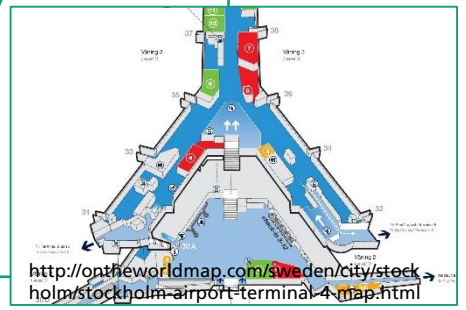
Distancing

ABM

Terminal layout







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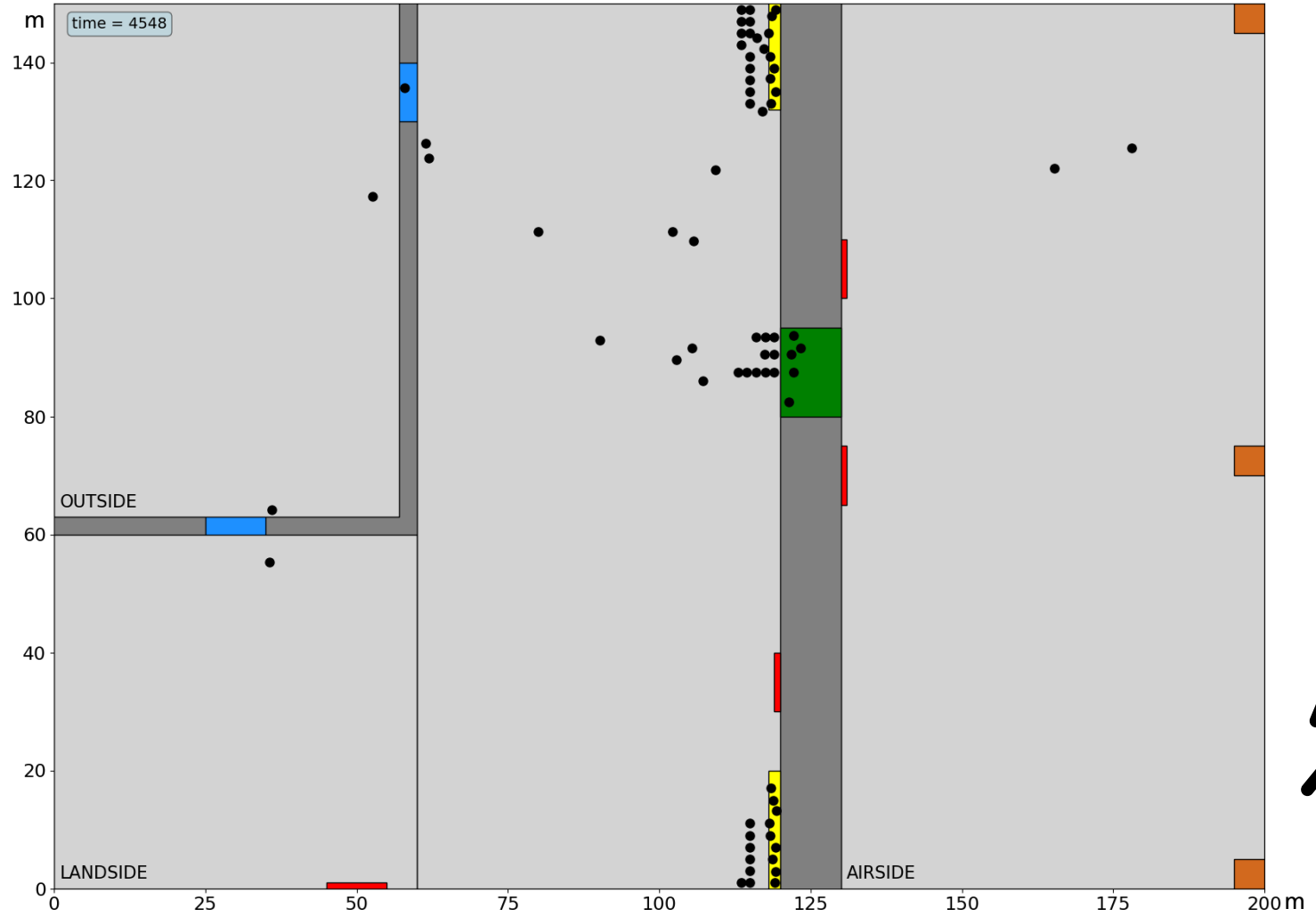
Hybrid model: Agent-Based Model (ABM)

ABM



Doors

FIDS monitors

Check-in

Security check

Gates

PA broadcasting stations

- Velocity
- Size
- Min. distance between agents
- Number of bags

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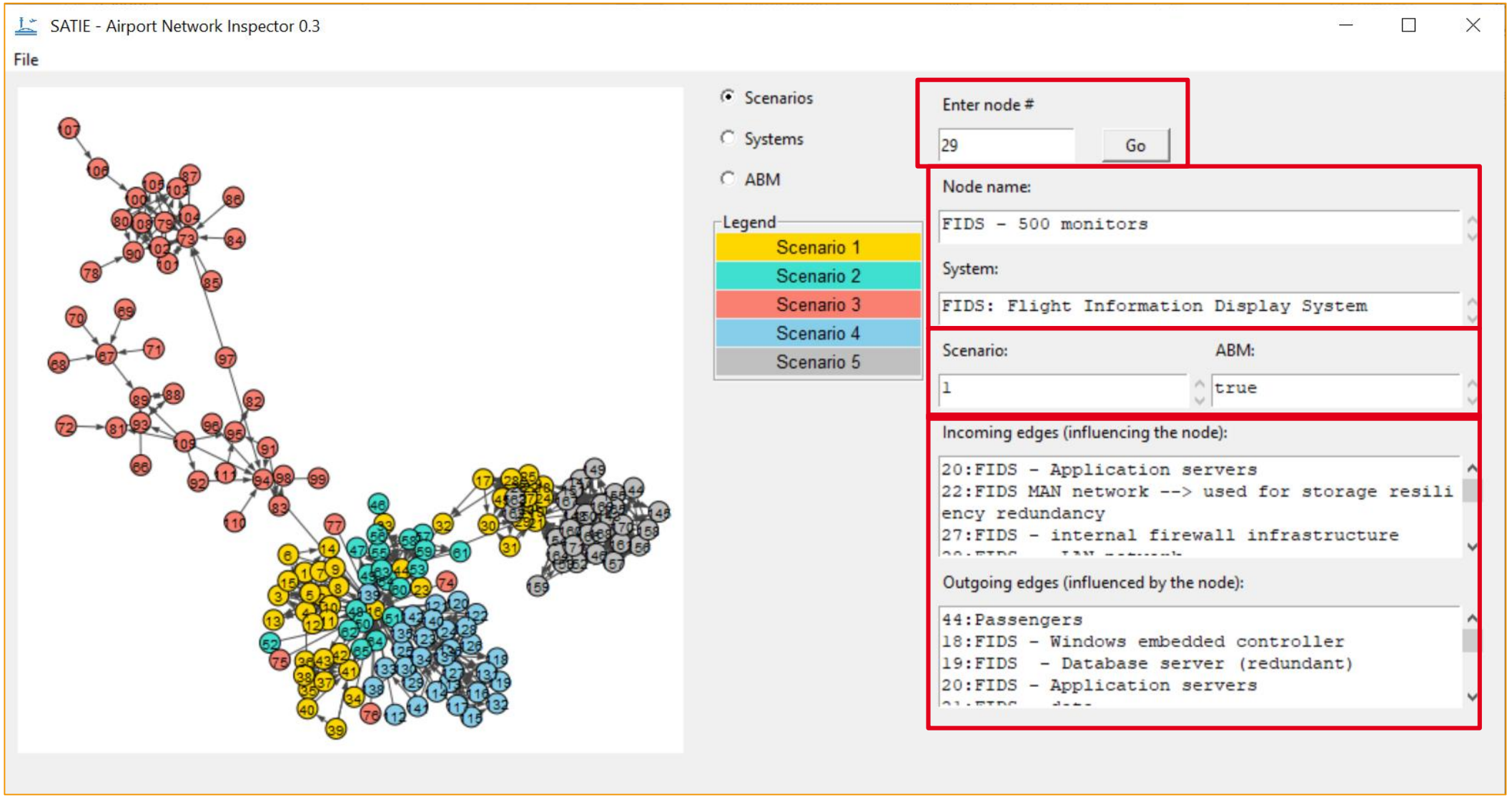
Hybrid model: Network model

Network model



1) Select node

2) Get name and system

3) Get scenario and potential interface to ABM

4) Get details about connected nodes

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Simulation: test case – scenario 1

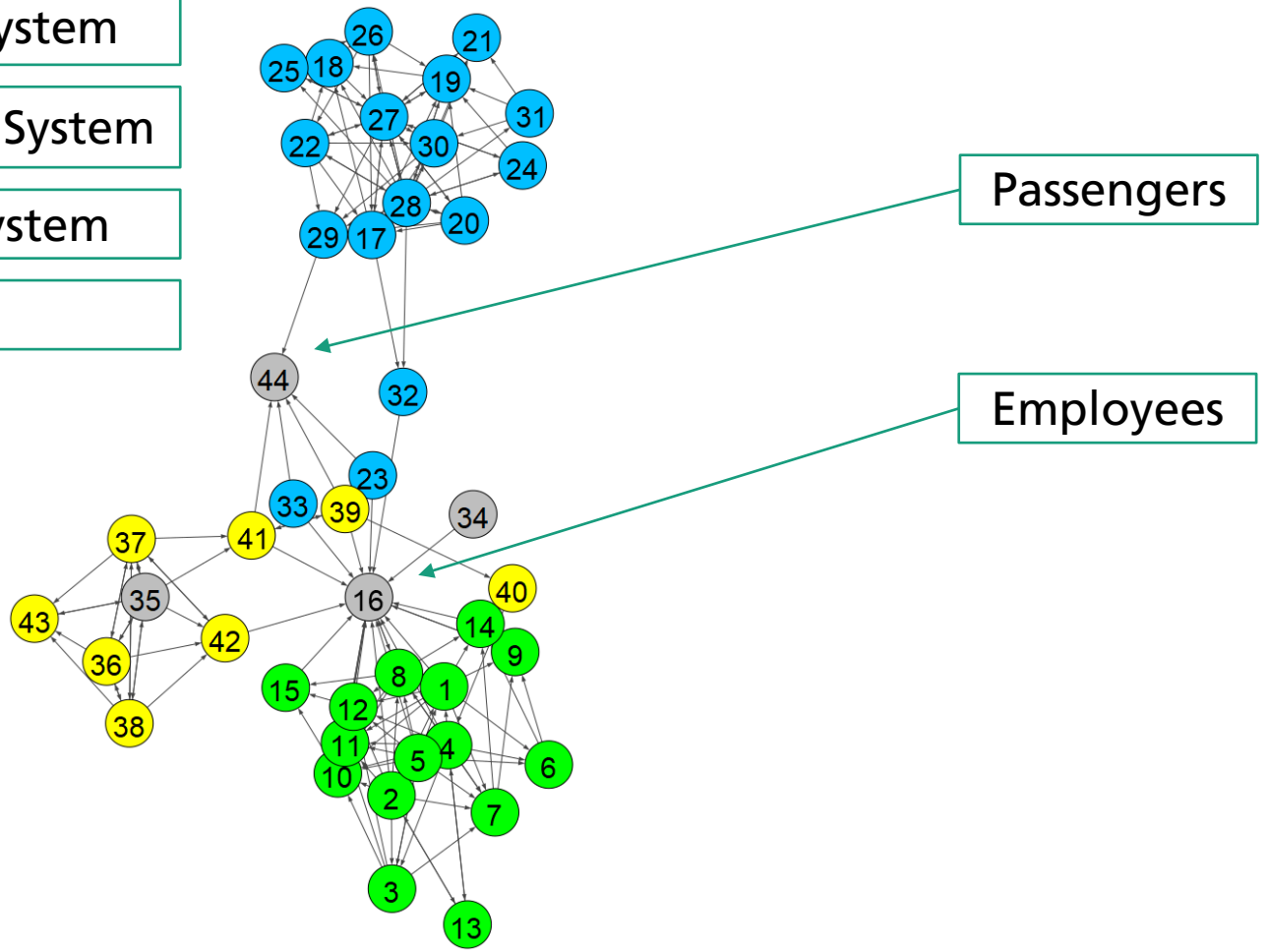
Network model

Physical Access Control System

Flight Information Display System

Public Announcement System

Other



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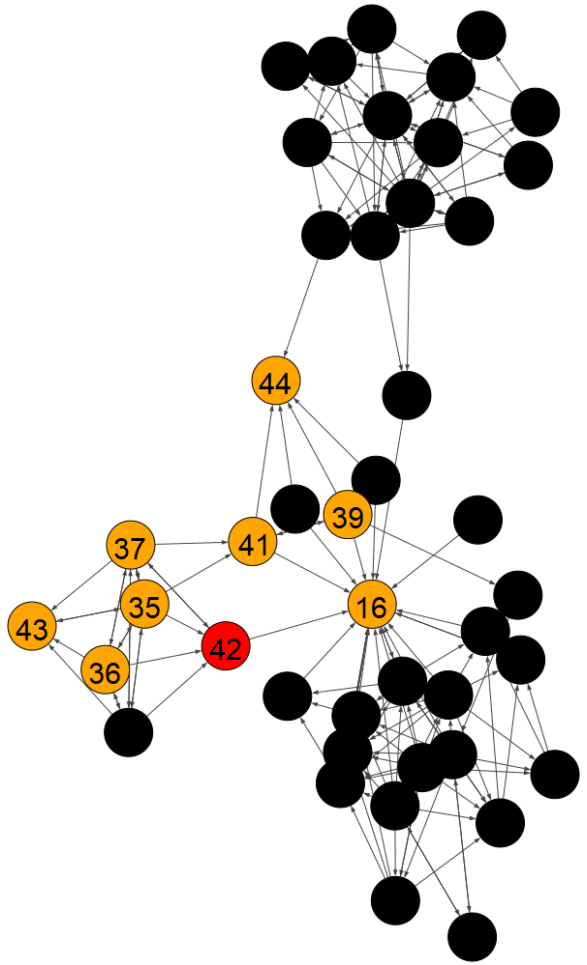
Simulation: test case

Network model

- Initial attack
- Impacted assets
- Not impacted assets



42	Work station (PA)
37	Firewall
36	Distribution switches
35	Core switches
43	Server with DB (PA)
41	Broadcasting station
39	Amplifiers
44	Passengers
16	Employees
	Not impacted assets

15min

5min

Time

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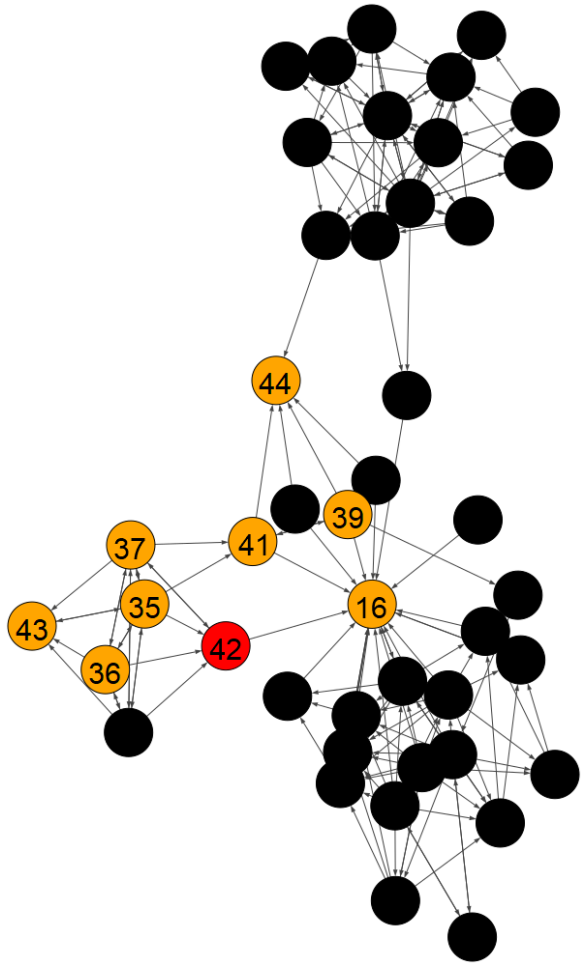
Simulation: test case

Network model

- Initial attack
- Impacted assets
- Not impacted assets
- Connection to ABM



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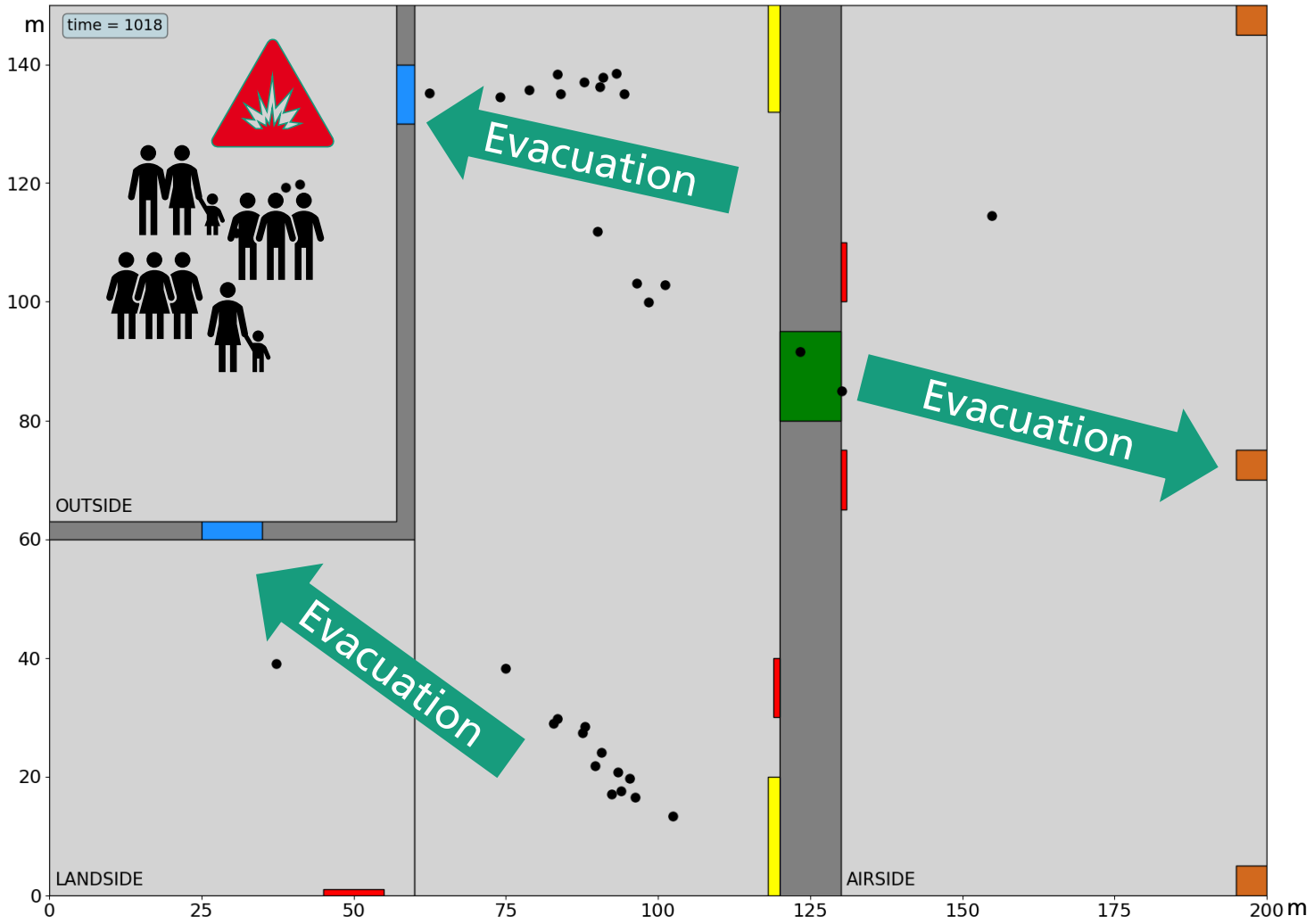
Simulation: test case

ABM



Doors

FIDS monitors

Check-in

Security check

Gates

PA broadcasting stations

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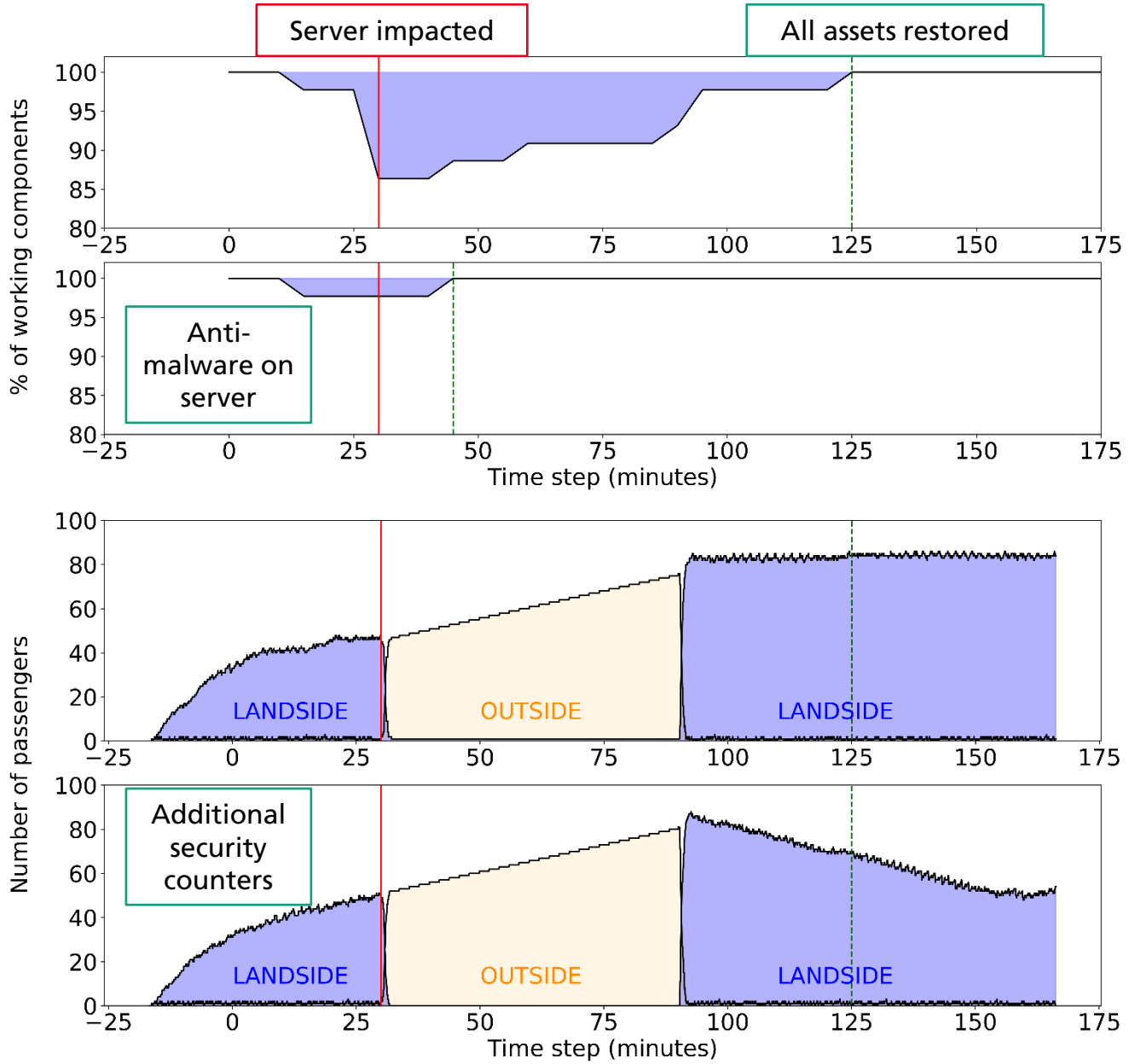
Simulation: results



Network model

ABM

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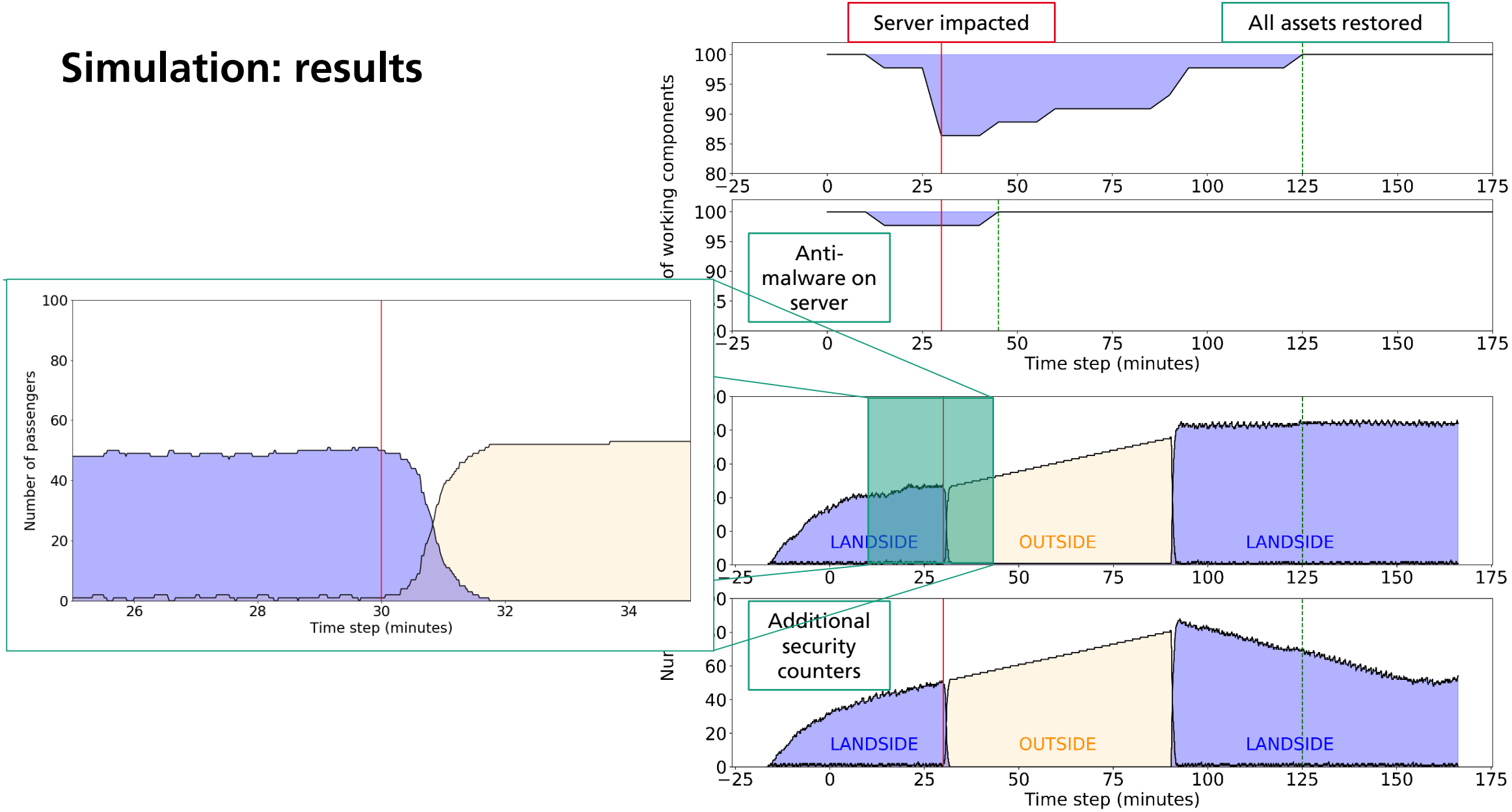
Simulation: results



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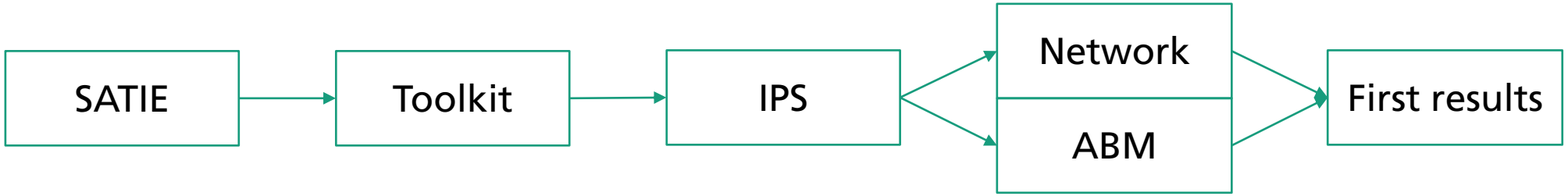
SUMMARY AND OUTLOOK



- Automate the integration of network model and ABM
- Include the complete network and enhance the airport layout
- Define further propagation rules
- Vary the number of passengers and mitigation options
- Validate the IPS in SATIE demonstrations

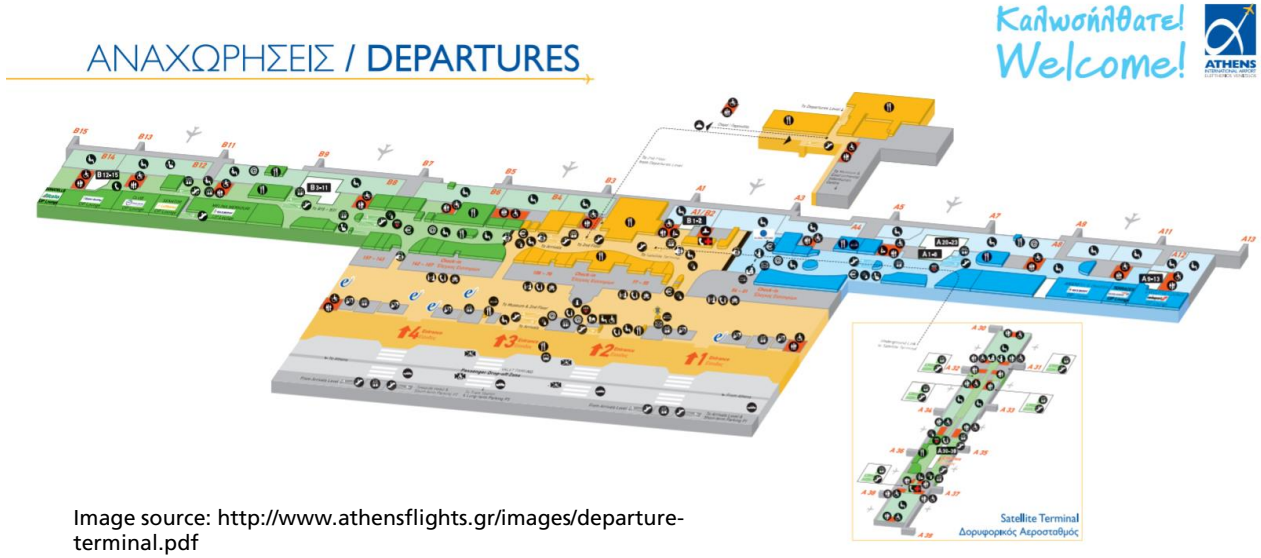


Image source: http://www.athensflights.gr/images/departure-terminal.pdf

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THANK YOU VERY MUCH FOR THE ATTENTION

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