Multi-Model Based Incident Prediction and Risk Assessment in Dynamic Cybersecurity Protection for Industrial Control Systems

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Outlines

Introduction

Background

Driven by computer technology, communication technology and intellectual technology, Industrial Control Systems (ICSs) develop towards the direction of intellectualization and network.

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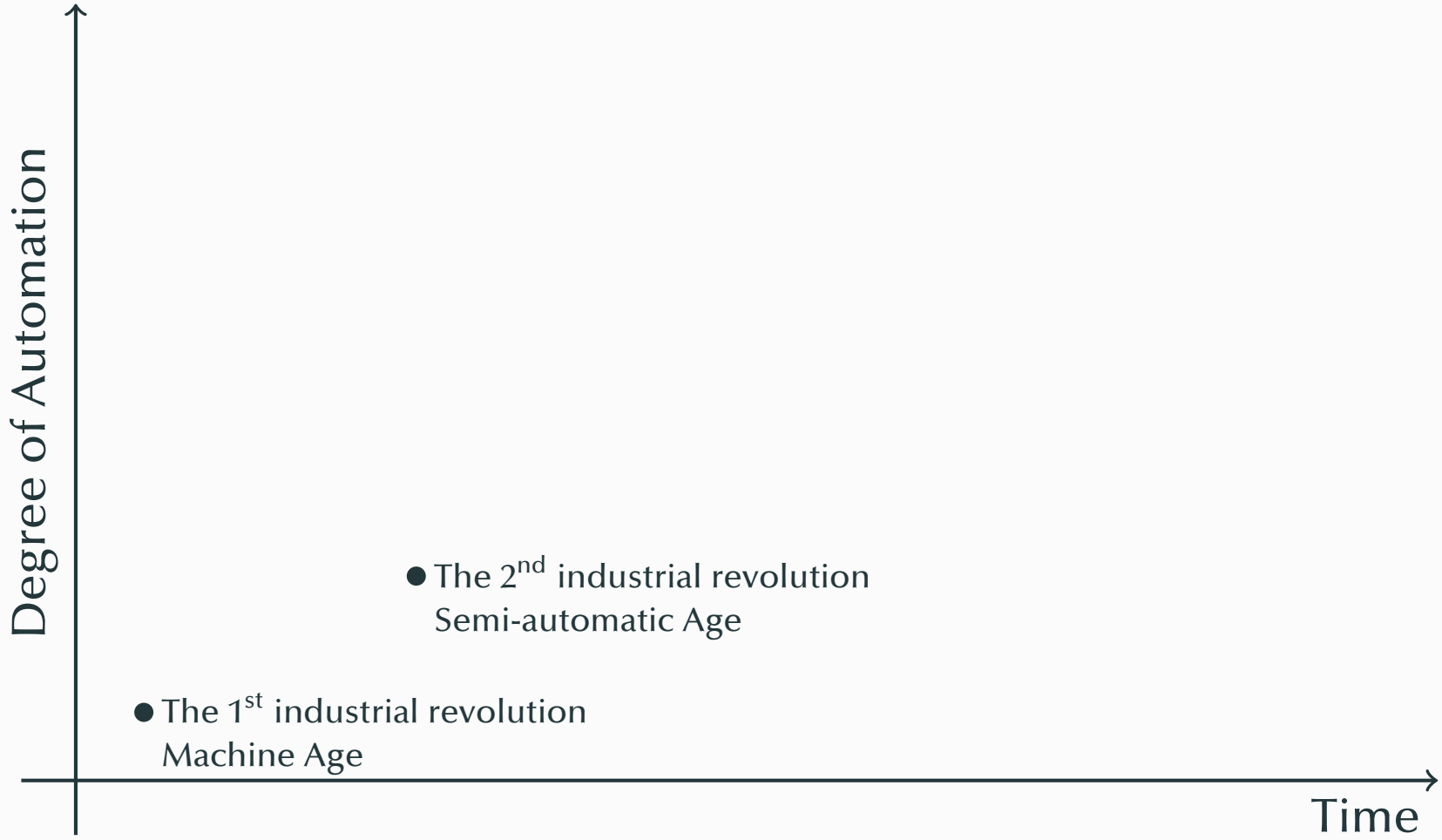

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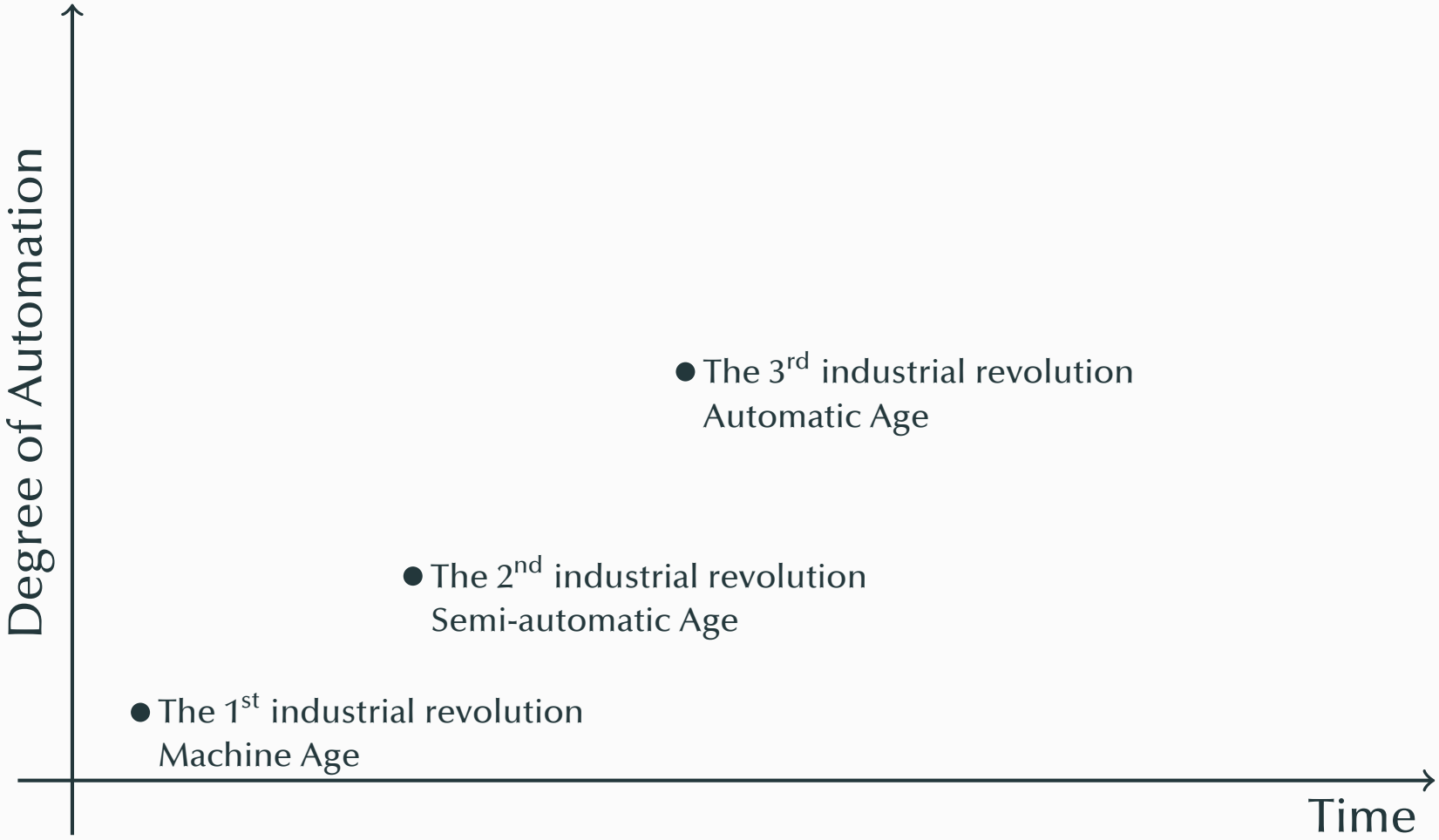

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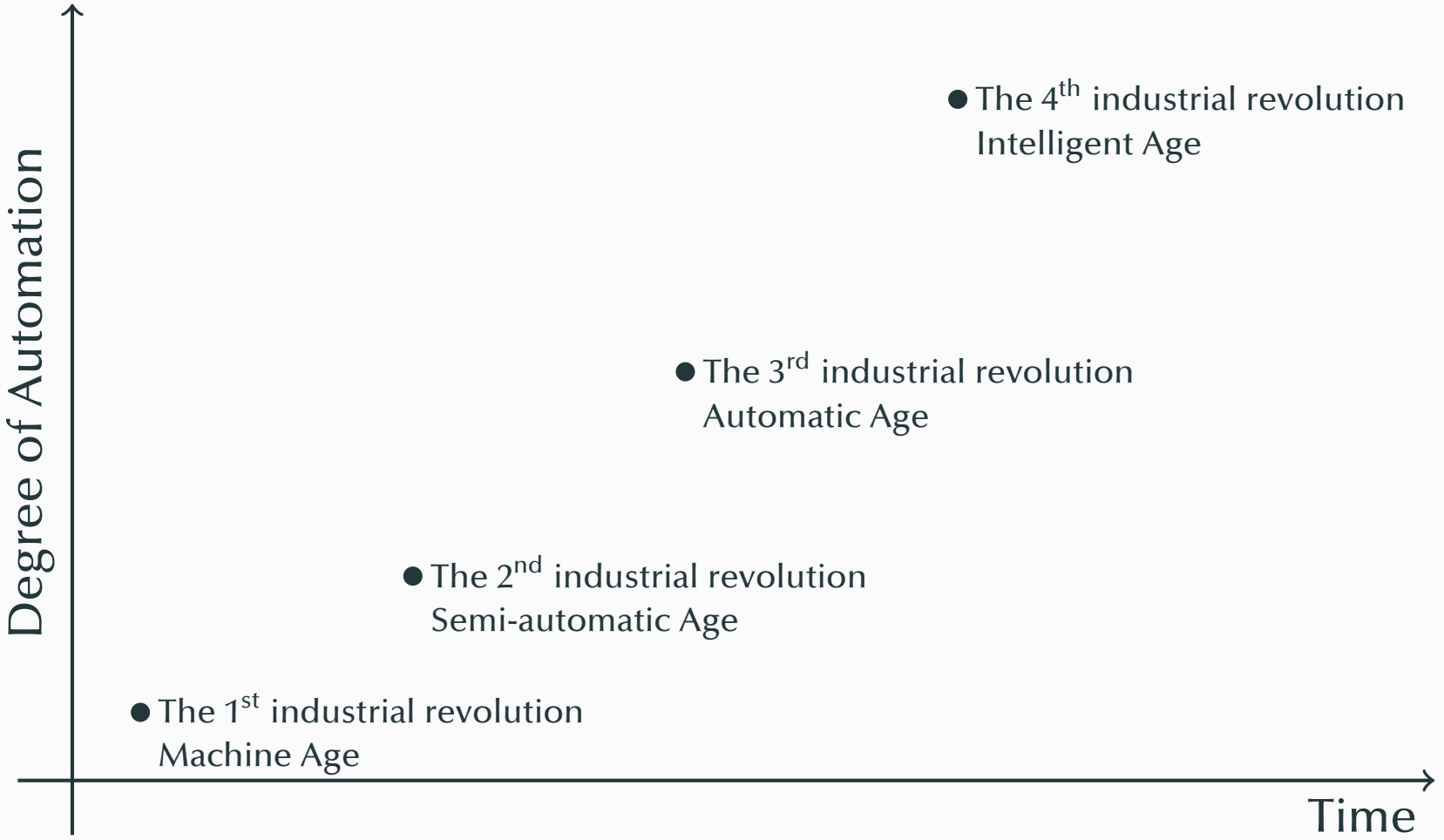

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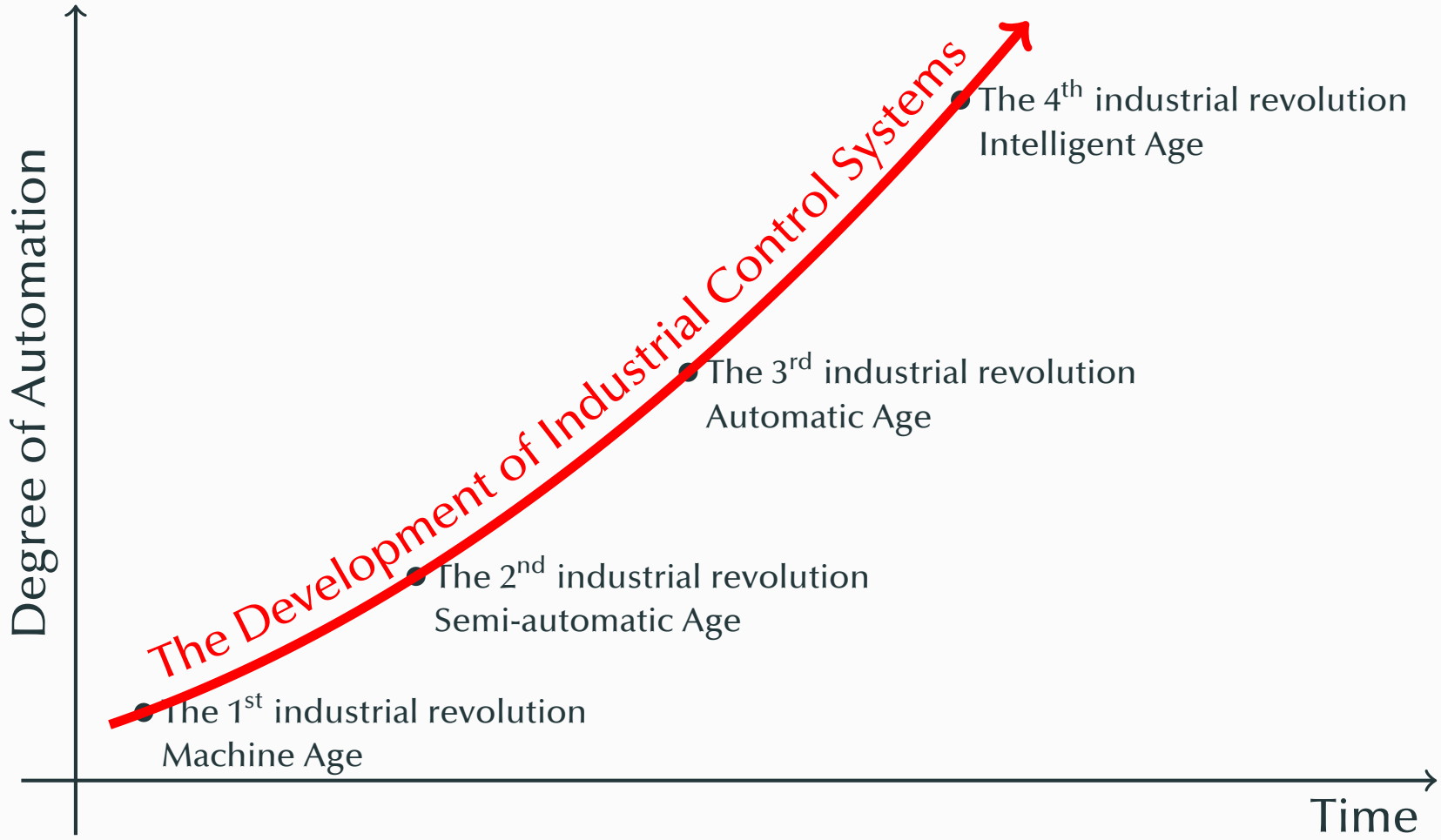
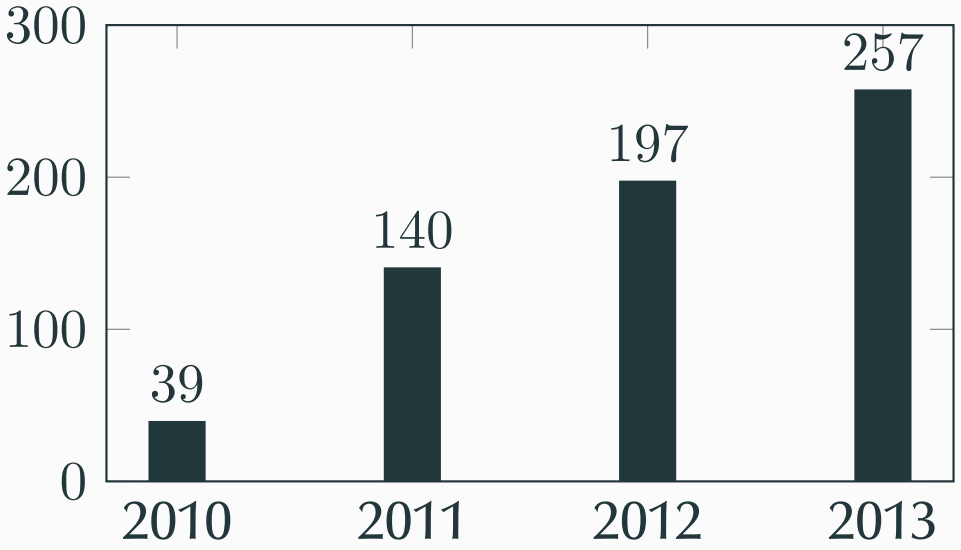


Background

- ICSs have been widely applied in various industry of the national economy and people's livelihood, and gradually become the brain and central nervous of critical infrastructure and all kinds of industrial production.
- Once abnormal situation appears in ICSs , serious accidents may be happen, which may cause damage to property, people or a wide range of environment.

Background

- In 2010, Stuxnet attacked Iran's nuclear power plants and ruined almost one-fifth of Iran's nuclear centrifuges.
- In 2013, Israel Haifa highway control system was attacked by hackers, which caused massive traffic congestion in the city which lead great loss and serious subsequent problems.
- In 2014, Havex malware infects many industrial control system in European and caused the leakage of large amounts of data.



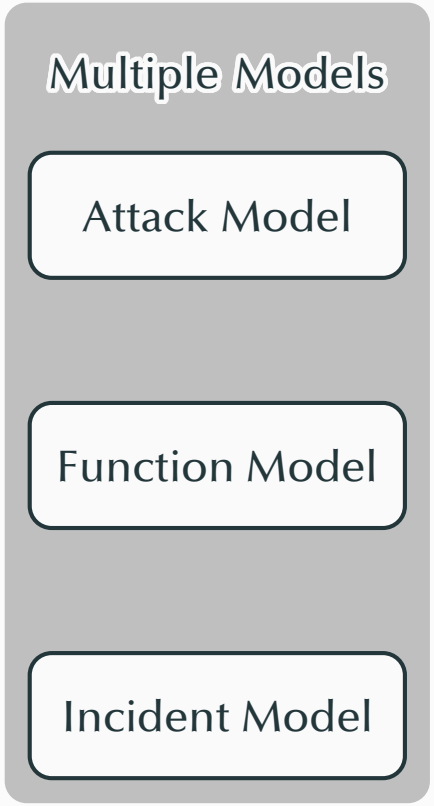
Industrial Control Systems Event Statistic

Problems

- Timeliness and availability
- Overlapping
- Unknown Attacks

Architecture

Architecture of Cybersecurity Risk Assessment for ICSs



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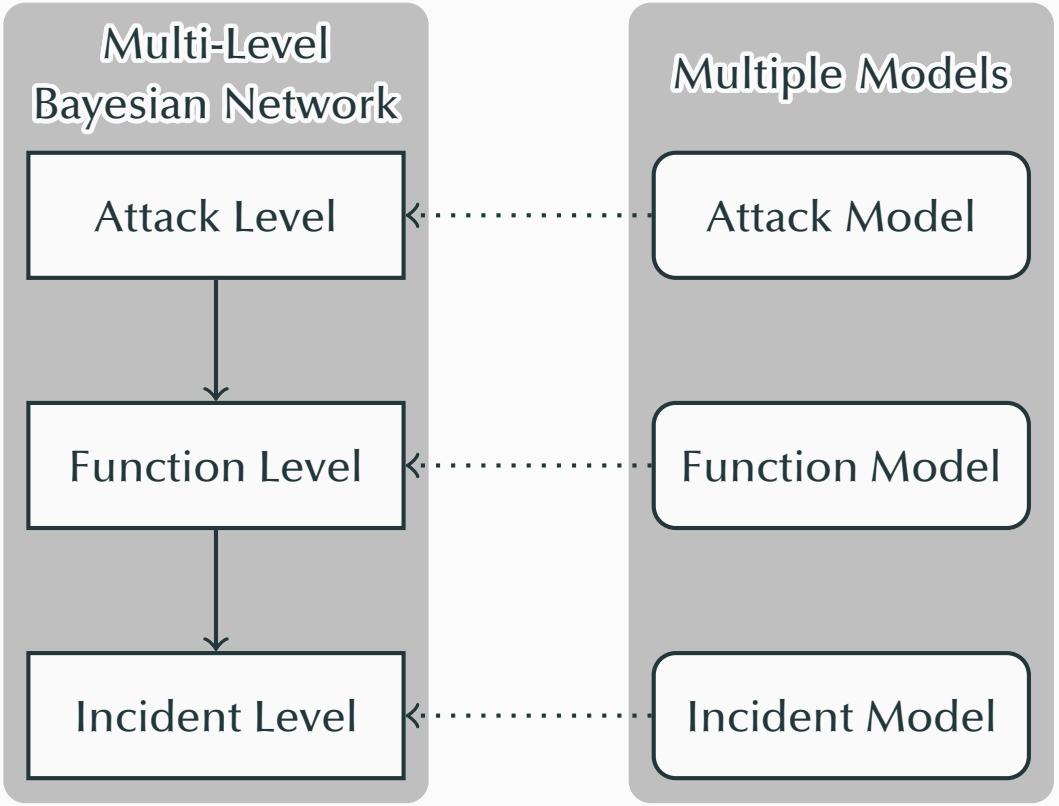

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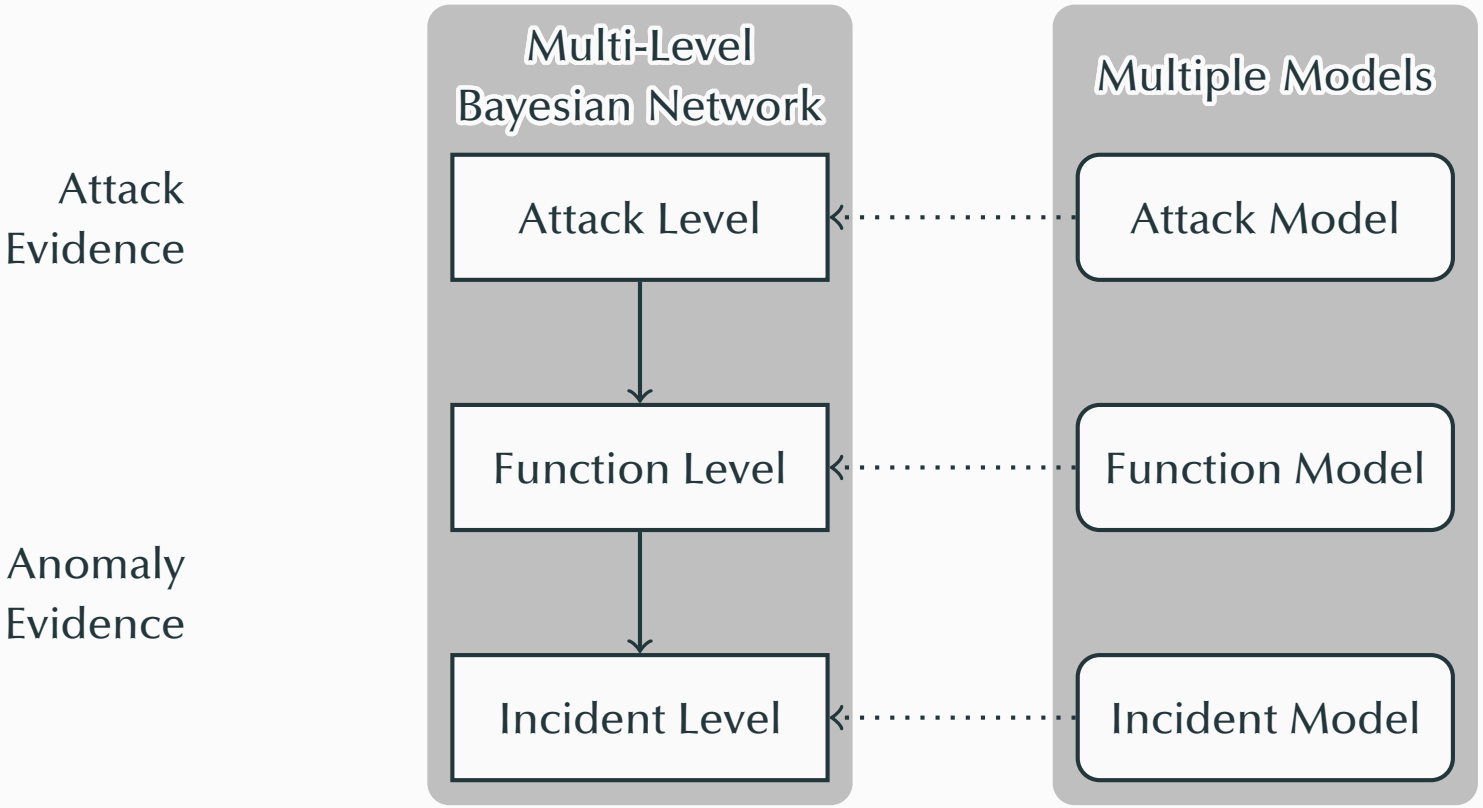

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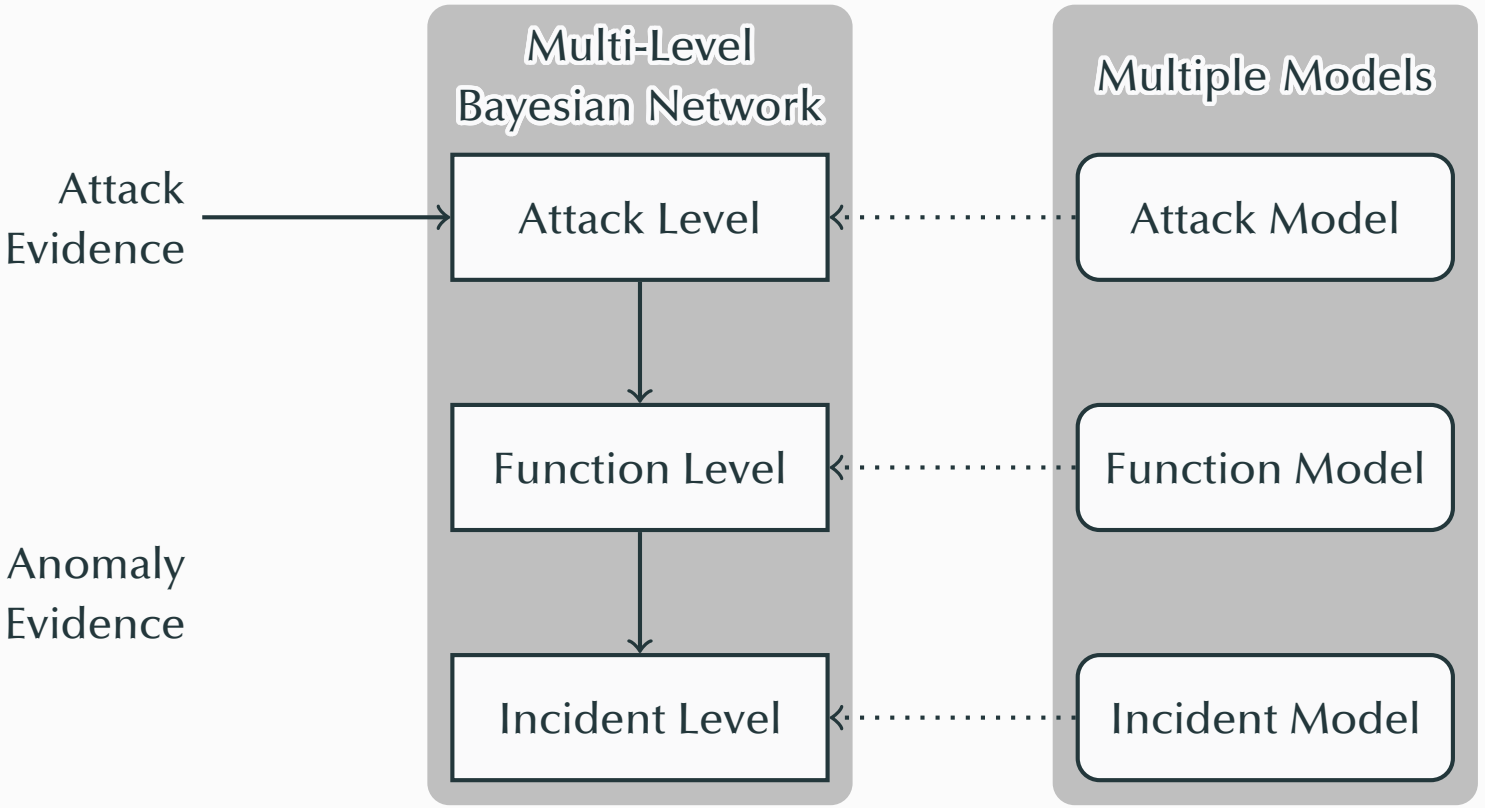

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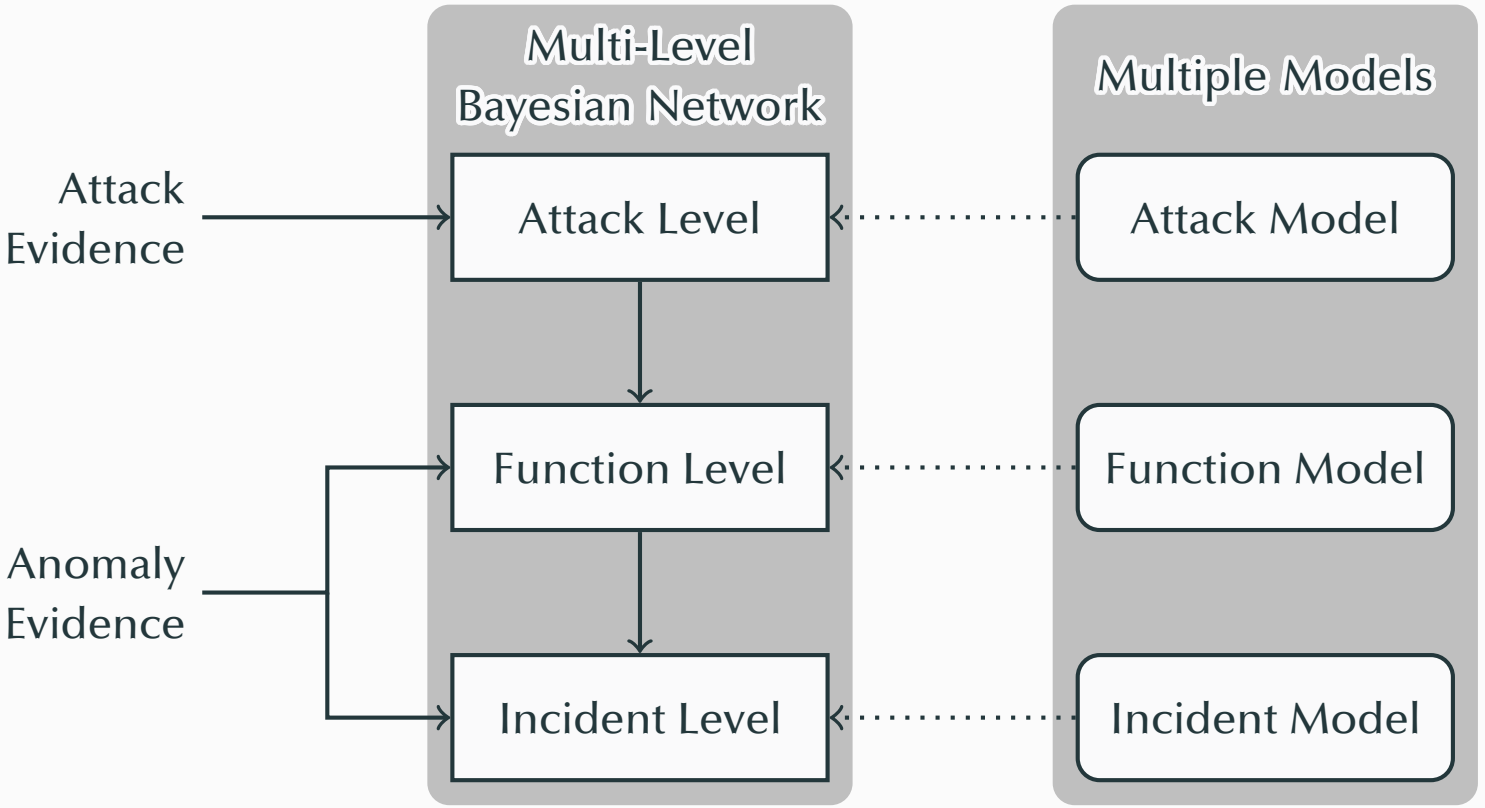

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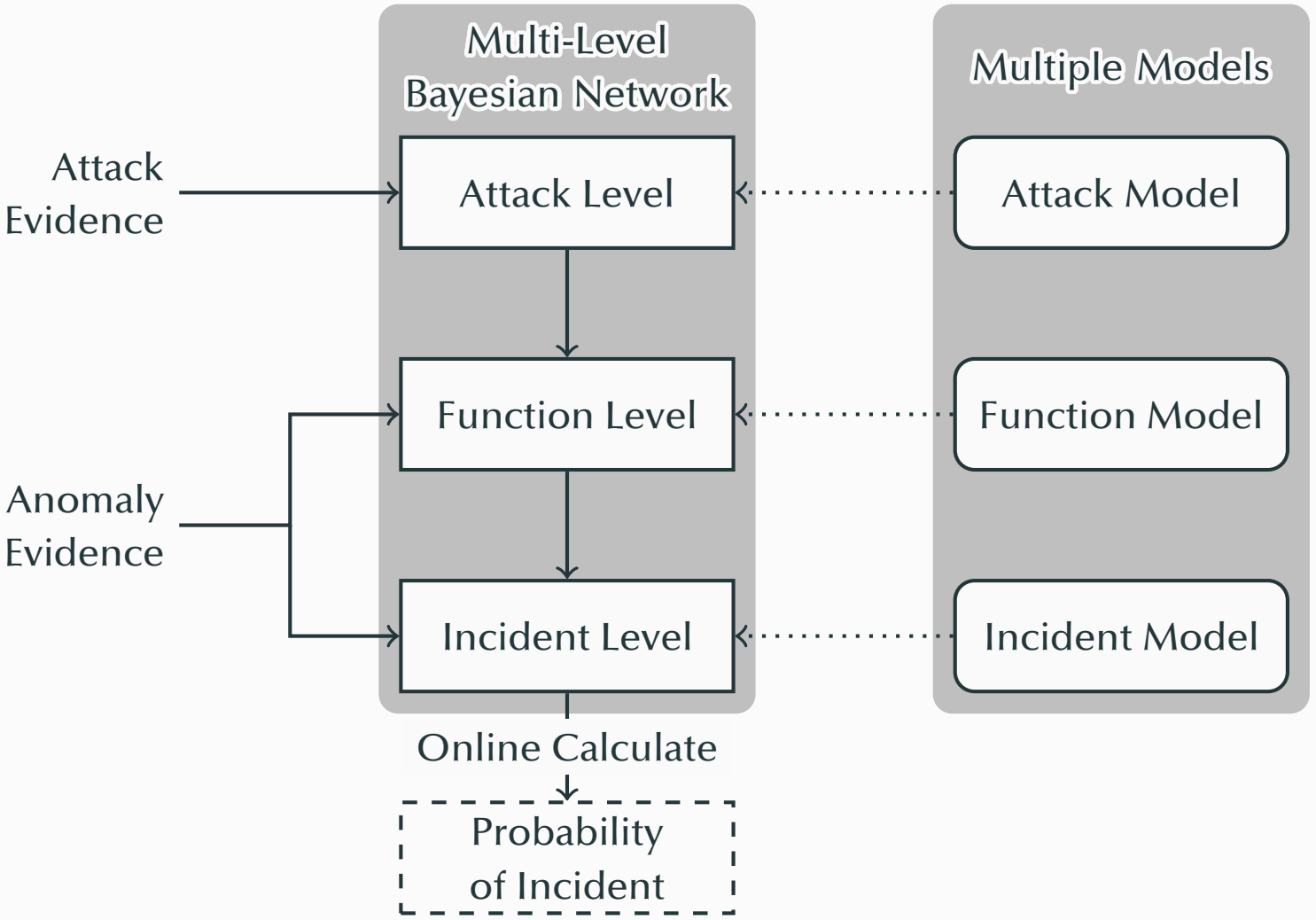

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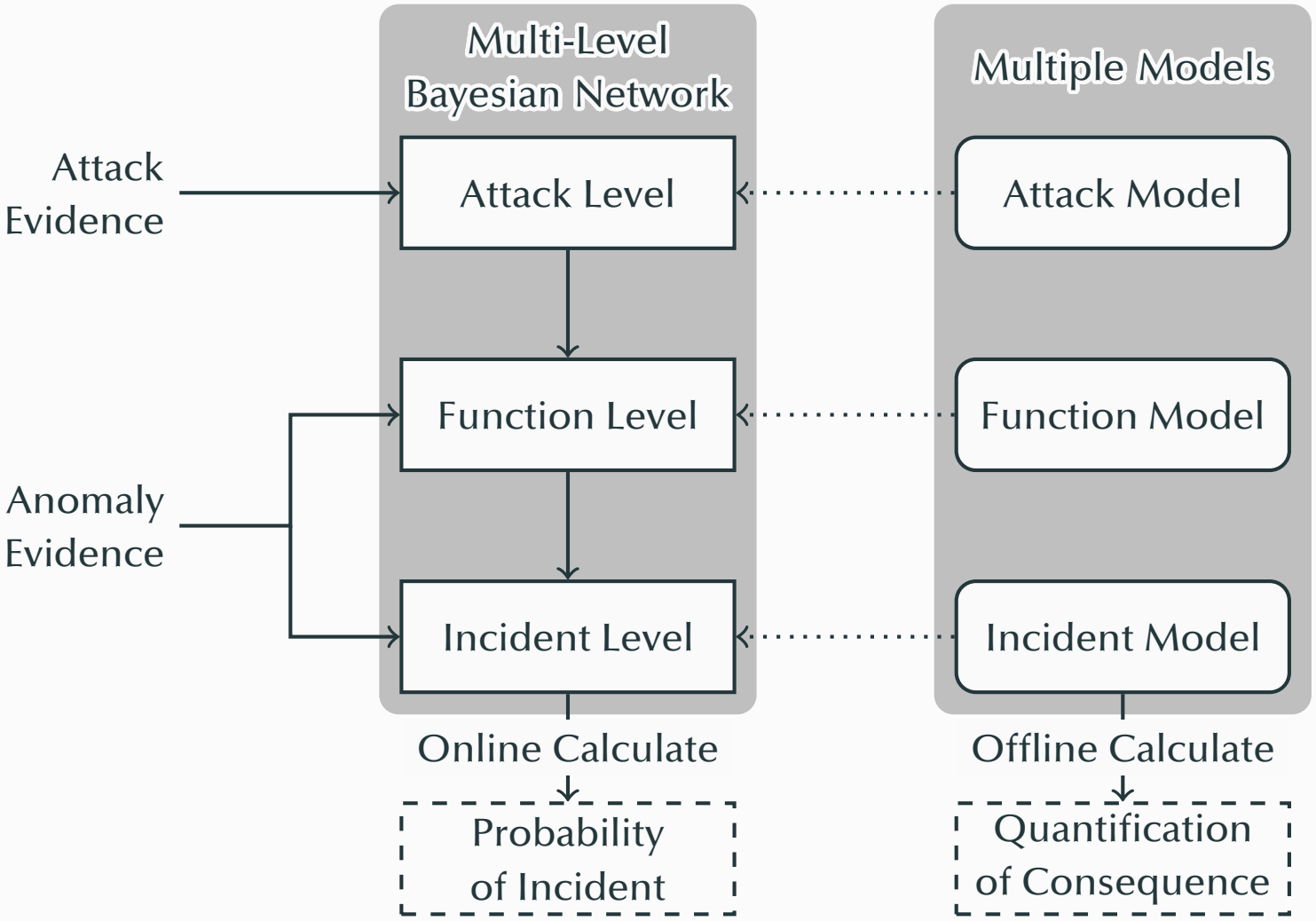

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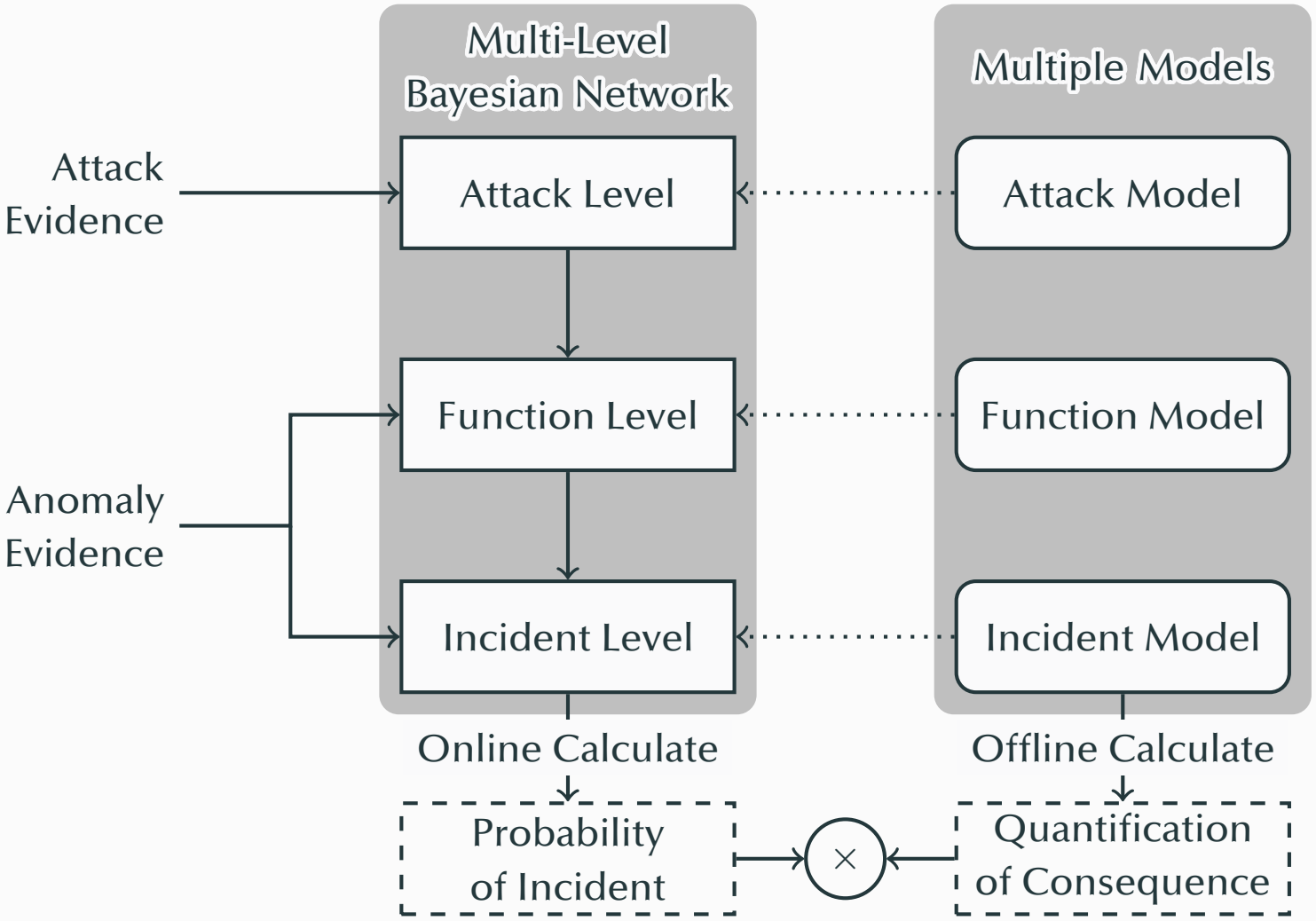

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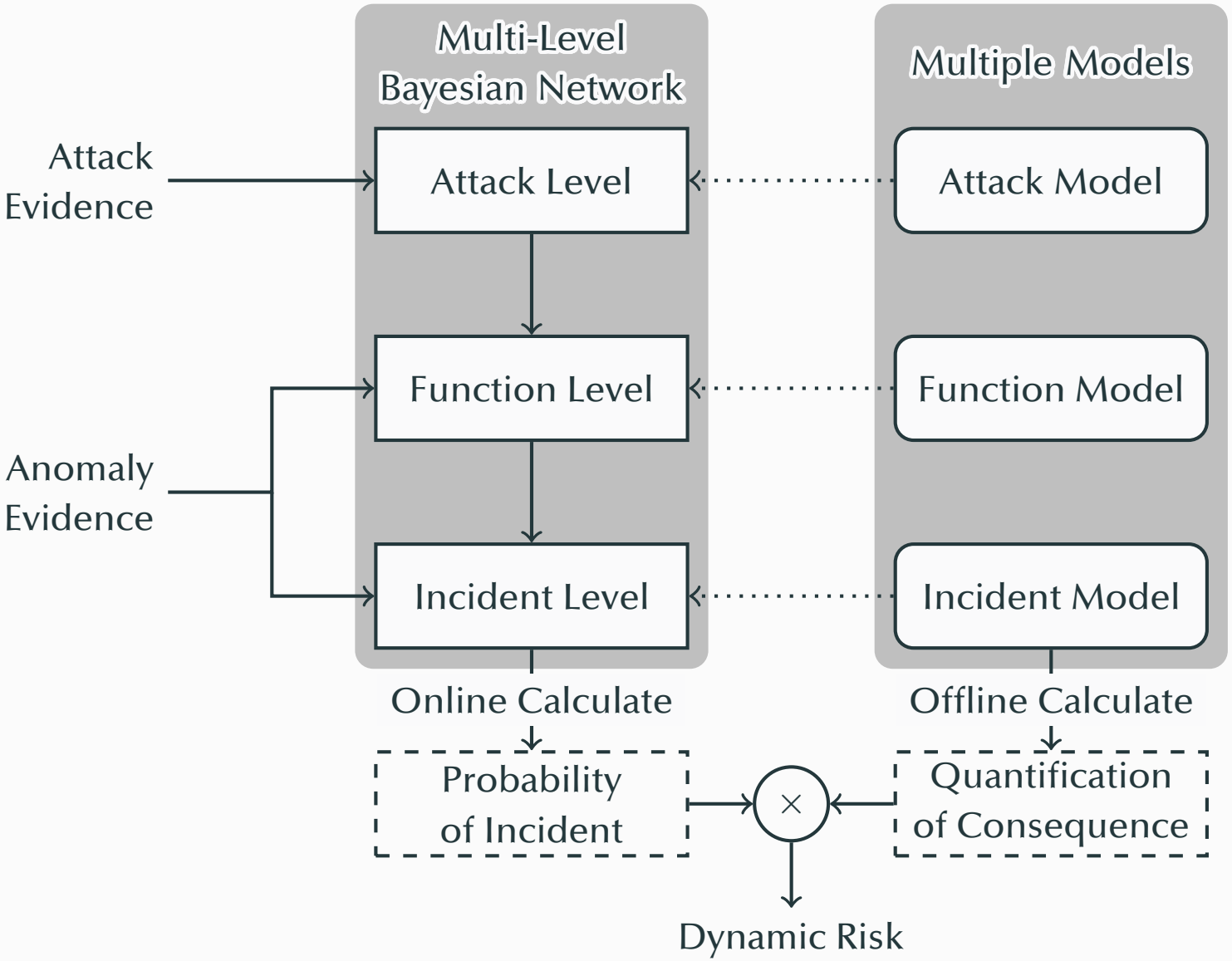

Hazardous Incident Prediction

Attack Level

Function Level

Incident Level

Collection of Evidence

Calculation of Incident Probability

Dynamic Risk Assessment

Harm to Humans

Environmental Pollution

Property Loss

Quantification of Harm to Humans

Quantification of Environmental Pollution

Quantification of Property Loss

Calculation of Dynamic Risk

Simulation

Knowledge Modeling and Simulation Platform

Simulation and Result Analysis

Questions?