CASE STUDY: GLOBAL ANOMALY DETECTION

PROBLEM STATEMENT

A multinational company needs to audit expense reports both historically and ideally, before approval, ensuring compliance with regional policies, corporate guidelines, and vendor contracts. However, circumstances can prevent centralizing financial and personal data across regions, making traditional data lake approaches impossible if not impractical. These circumstances include:

- Privacy laws (e.g., GDPR, CCPA)
- Internal policy restrictions
- Siloed systems
- Lack of IT domain knowledge or talent

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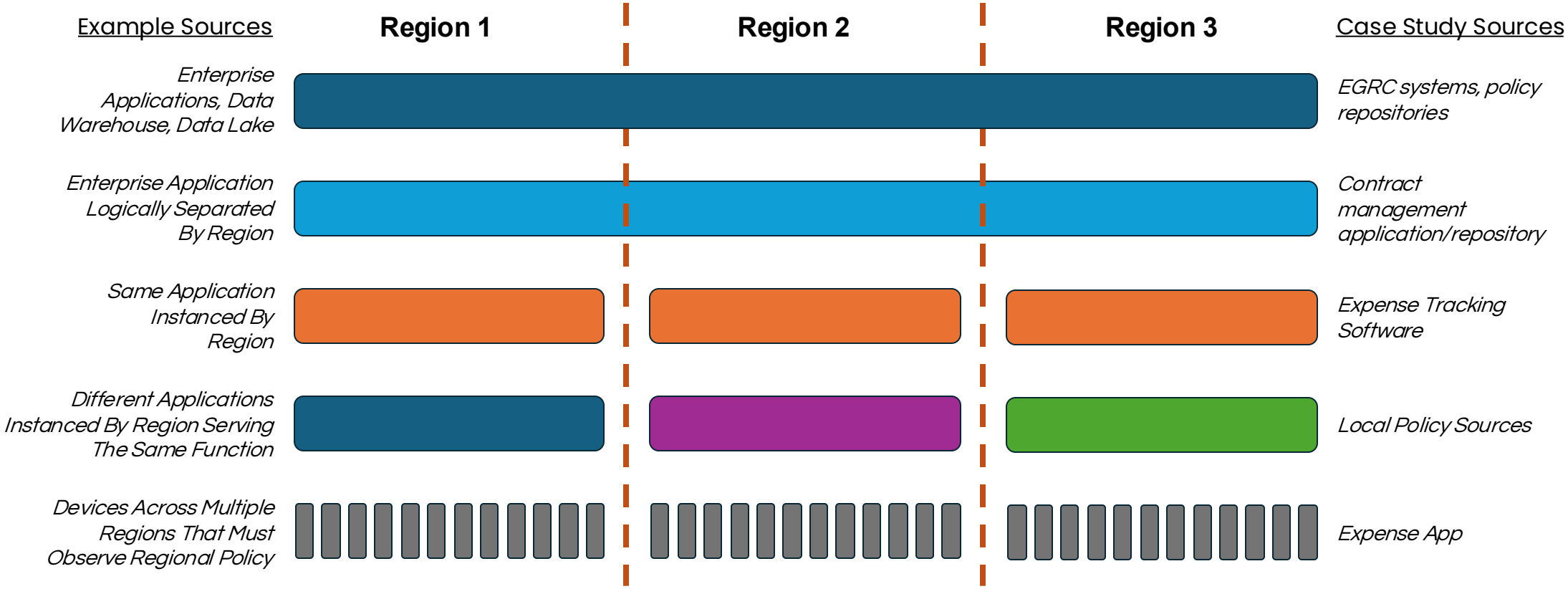
LANDSCAPE

In this case, insights may require evaluating data across multiple applications and regions. Sourcing and colocating data is prohibited making enterprise level insights difficult to obtain.



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FEDERATED LEARNING APPLICATION

1. **Local Model Training** – Each region trains an expense auditing model on its own data, ensuring compliance with local privacy laws.
2. **Federated Aggregation** – Instead of sharing raw expense data, only model updates are sent to a central server, enabling cross-regional learning while maintaining data sovereignty.
3. **Automated Auditing** – When an expense is submitted, the local model checks it against regional policies, historical data, and contract terms, flagging anomalies or approving legitimate claims.
4. **Continuous Improvement** – As fraud patterns and policies evolve, regions fine-tune models, and FL aggregates insights globally without violating privacy regulations.
5. **This ensures privacy, efficiency, and global fraud detection while keeping expense data localized.**

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FEDERATED LEARNING APPLICATION

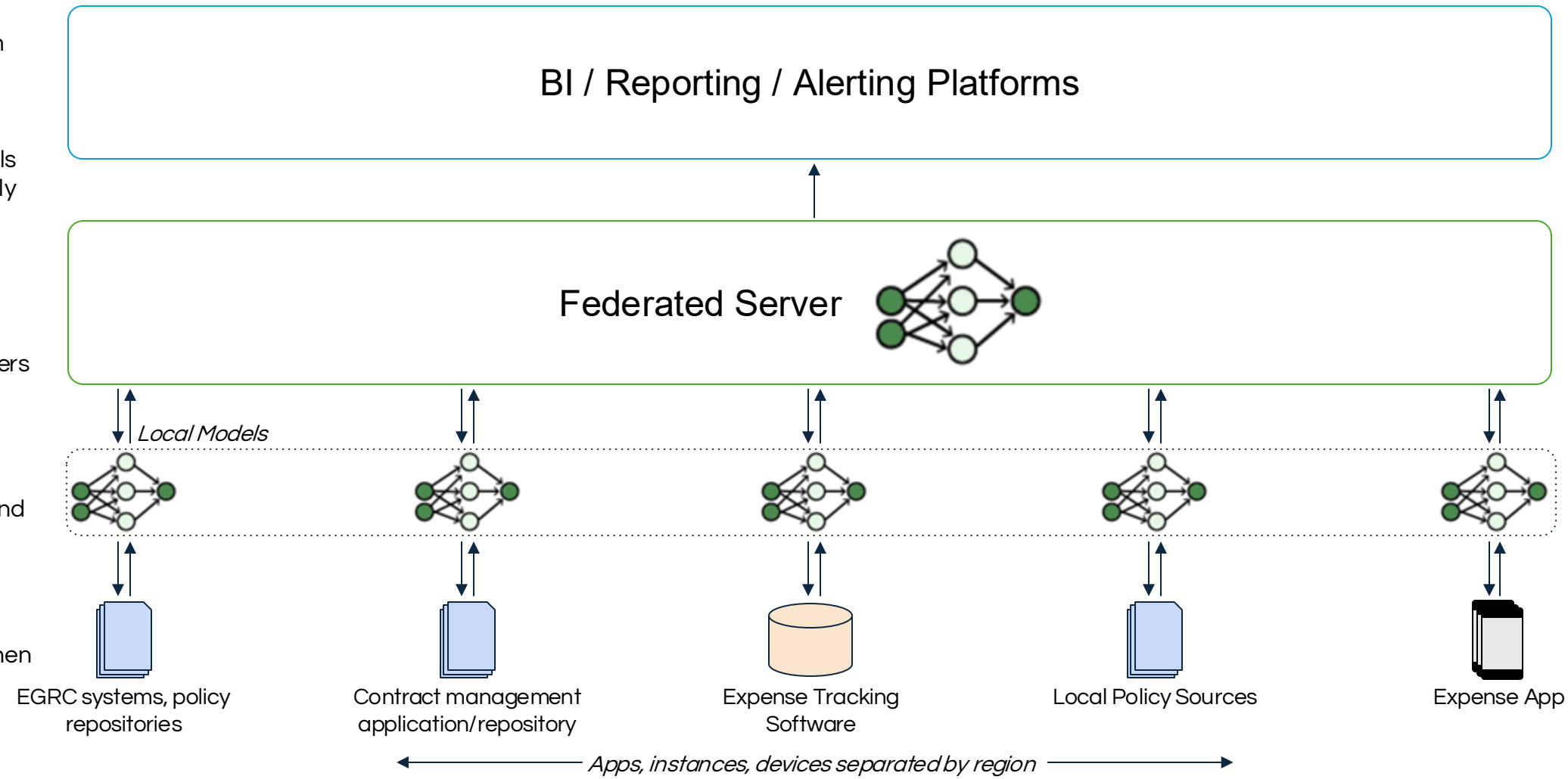
1. General model is generated and then sent to the various systems or devices

2. Distributed models learn locally and only the parameters are sent back to the server

3. Federated server uses local parameters to generate a consensus

4. The local models are then updated and the process is repeated until the model converges

5. Model output is then piped to the appropriate operational applications



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SAMPLE IMPLEMENTATION

Enterprise model is defined to identify expense fraud, waste and abuse. Copies of this model are sent to regionally segregated systems to train and return parameters for model improvement. Once patterns are established, reporting can be created.