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Intelligent Time-Off Recoupment: An ERP-Integrated System for Multi-State Payroll Compliance

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ABSTRACT

Introduction: Many organizations allow employees to use paid time off (PTO) before they have fully earned it. This helps improve employee satisfaction and retention. However, when employees leave the organization with a negative PTO balance, employers face challenges recovering the overpaid amount while following federal and state payroll laws.

Objectives: This paper introduces the Intelligent Time-Off Recoupment System (ITORS), a framework designed to automate the recovery of advanced PTO. The goal is to improve payroll compliance, reduce financial losses, and create a consistent process for managing PTO recoupment across different states.

Methods: This study uses a design science research approach to develop the ITORS framework. The system was designed after reviewing current PTO recoupment practices, payroll regulations, HR technology capabilities, and compliance requirements. The framework includes five connected components: the HR Policy Engine, Absence and Balance Monitor, Consent Workflow Module, Payroll Recoupment Engine, and Compliance Reporting Hub. The compliance framework was built through a systematic review of wage deduction statutes across all 50 U.S. states, identifying three distinct regulatory patterns that the system must handle at runtime.

Results: The proposed system provides an automated process for tracking negative PTO balances, collecting employee consent, calculating payroll deductions based on state-specific rules, and generating compliance reports. The framework addresses common problems found in manual PTO recoupment processes, including missing consent records, non-compliant deductions, delayed recovery actions, and limited reporting visibility. ITORS can also integrate with major ERP and HCM platforms such as Workday, Oracle HCM Cloud, SAP SuccessFactors, ADP Workforce Now, and other enterprise systems.

Conclusions: ITORS provides a practical and scalable approach for managing PTO recoupment in organizations operating across multiple states. By combining compliance automation, payroll integration, employee consent management, and reporting capabilities, the framework helps organizations reduce risk, improve compliance, recover overpaid PTO more effectively, and maintain transparency with employees.

Keywords: Time-Off Recoupment, Negative PTO Balance, Payroll Compliance, ERP Integration, HCM Systems, HR Technology, Payroll Automation, Employee Consent, PTO Recovery, Enterprise Architecture, Workday, ADP Workforce, Oracle Cloud, Human Capital Mangement.

1. INTRODUCTION

The way organizations design employee leave policies has changed a lot over the last ten years. Research shows that having flexible access to leave strongly affects whether employees stay with a company. Lack of flexibility is often cited as a top reason for employees leaving voluntarily (Gallup, 2024), and not supporting employee well-being also contributes to people quitting across industries (McKinsey & Company, 2022). To address this, many companies now allow employees to use paid time off before it is fully earned. This helps reduce financial stress for new employees during their first months at work (Vinopal, 2026; Turner, 2025).

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With this approach, employees can take leave early in their employment, such as within the first few months, even if they have not accrued it yet. Doing so helps build trust, makes it easier for employees to use leave, and increases satisfaction during the time when they are most likely to leave the company (TimeOffCloud, 2024; Benefits Canada, 2024). However, this also creates a financial risk for the employer. If someone leaves before earning back the leave they used, the company ends up paying more than it should. Recovering this overpayment is complicated because it involves federal regulations, state-specific wage laws, and employee relations rules (Klein et al., 2023; Thurston, 2023).

Most enterprise human capital management systems are not built to handle this process automatically and in compliance with the law. As a result, the recovery process is often broken into separate steps. Payroll and absence tracking systems may not work together, employee consent may not be recorded properly, and final paycheck deductions sometimes fail to follow state minimum wage rules. Recovering unpaid leave after someone leaves is often expensive and rarely fully successful (Payroll Partners, 2025; CBIA, 2024; Mercer, 2024). Because of these issues, companies often have to absorb the loss.

This paper introduces ITORS, the Intelligent Time Off Recoupment System, which is a multi-part enterprise system that manages the full process of recouping advanced leave. It starts from when an employee creates a negative leave balance and goes all the way through post-separation compliance reporting. Section 2 reviews the relevant research, Section 3 explains the problem, Section 4 shows the system architecture, Section 5 outlines the compliance framework, Section 6 describes the implementation design, and Sections 7 and 8 discuss implications and conclusions.

2. LITERATURE REVIEW

This section reviews existing research related to paid time off (PTO), legal rules for wage deductions, HR system integration, and fairness in employee decisions. It explains how advanced PTO works as a retention tool, the legal limits around recovering unused leave, and how current ERP and HCM systems handle payroll and absence management. It also highlights gaps in automation and the importance of clear communication and employee consent in compensation-related decisions.

2.1 Advanced PTO as a Retention Instrument: Research has shown that the way leave policies are designed can strongly influence whether employees stay with a company. Perceived organizational support, which refers to how much employees feel their employer values them and cares about their well-being, is linked to stronger commitment and lower turnover (SHRM, 2023; Adams, 1965). Policies that offer flexible leave and allow employees to use PTO before it is fully earned send a clear signal of this support. Evidence also shows that access to flexible leave improves job satisfaction. Advanced PTO, in particular, is associated with higher retention during the early months of employment, especially in sectors like professional services, technology, and financial services (HumanI HR, 2024; Vinopal, 2026; Vámosi & Dajnoki, 2023). Importantly, the positive effects of advanced PTO do not decrease when companies clearly explain the rules for recouping leave. Employees who understand both the benefits and the conditions, including the organization's right to reclaim advanced leave if they leave, report satisfaction levels similar to employees who receive PTO without detailed rules (TimeOffCloud, 2024; Benefits Canada, 2024). This shows that clear communication and obtaining consent upfront is critical and should be part of system design.

2.2 Federal and State Legal Framework for PTO Recoupment: Recovering advanced PTO is not straightforward, as it sits within both federal and state level regulations. At the federal level, the Fair Labor Standards Act provides general guidance. According to the Department of Labor, employers can recover advanced PTO from final wages if the policy was communicated in advance and the deduction is based on the employee's actual hourly rate (DOL, 2004; Klein et al., 2023). For exempt employees, the rules are more restrictive, and deductions are typically limited to full day amounts under an established leave policy (DOL, 2023; Thurston, 2023). Beyond federal rules, state laws introduce additional complexity. For example, California treats accrued vacation as earned wages, which means recoupment requires clear written agreements and cannot reduce pay below minimum wage (California DLSE, 2024). Connecticut allows deductions only under specific categories and requires written consent in an approved format (CBIA, 2024). Other states such as Arizona and Illinois allow deductions but still require minimum wage protections (Bohr, 2023), while Washington limits how long employers have to correct overpayments (Nolo,

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2023). Because of these differences, a single standard policy is not sufficient, and systems need to apply rules based on the employee's state.

2.3 ERP-HCM Integration and Payroll Automation Research: HCM platforms today are capable of handling complex workflows and connecting different types of data in real time. Research shows that modern systems can link absence tracking with payroll processing more effectively than older ERP setups (FuseWorkforce, 2024). There is also evidence that rule-based automation and better visibility into leave balances help organizations manage PTO more efficiently, especially when dealing with different employee groups. When employees can clearly see their leave balances, it reduces confusion, lowers the number of HR queries, and builds trust in the system (CloudApper, 2026; Mercer, 2024; Ekuma, 2024). Even with these improvements, the specific case of recovering advanced PTO when an employee leaves, is still not well automated in most organizations. In many cases, it is handled manually or through disconnected processes, which leads to inconsistency and errors (HRMorning, 2025; Dima et al., 2024). This gap between what systems can do and what is actually implemented is where ITORS fits in.

2.4 Procedural Fairness and Employee Consent in Compensation Decisions: Research on fairness in organizations shows that employees care not only about outcomes but also about how decisions are made. Equity theory explains that when employees feel there is an imbalance between what they contribute and what they receive, they may respond by reducing effort or disengaging (Adams, 1965). Later work on procedural fairness shows that when processes are clear, consistent, and communicated ahead of time, employees are more likely to accept decisions, even if those decisions are not in their favour (SHRM, 2023; Adamovic, 2023). In the case of PTO recoupment, this means that capturing consent at the time a negative balance occurs plays an important role beyond legal compliance. If employees are informed and agree to the terms when the leave is taken, they are more likely to view any deduction later as something expected rather than as an unexpected penalty (Paylocity, 2025; Rippling, 2025; Turner, 2025).

Overall, the literature shows that advanced PTO improves employee satisfaction and retention, but it also creates legal and operational challenges when employees leave with a negative balance. Existing laws vary across states, and most HR systems do not fully automate the recovery process. Research also shows that fairness and clear communication play an important role in how employees accept payroll decisions. These findings support the need for a structured, automated, and compliant system like ITORS.

3. PROBLEM STATEMENT AND CURRENT OPERATIONAL FAILURES

This section explains the main problem with advanced PTO systems and why organizations face financial and compliance risks when employees use leave before earning it. It also identifies the key operational issues that usually happen in manual or unstructured PTO recovery processes.

3.1 The Advanced PTO Overpayment Liability: When an organization allows employees to take paid time off in advance, it is effectively taking on a financial obligation. The value of this obligation depends on the employee's daily pay rate and the number of days taken beyond the earned balance. This is not an error but a planned part of the policy. However, when looked at across a large workforce, the total unrecovered amount can become significant. For example, in an organization with five thousand employees and an annual attrition rate of five percent, if around thirty percent of departing employees have a negative balance averaging two days, and the average daily rate is four hundred dollars, the organization could face roughly one hundred twenty thousand dollars in unrecovered amounts each year if no action is taken. This does not include the additional risk that comes from incorrect or non-compliant deduction practices (Klein et al., 2023; Thurston, 2023). Both the financial loss and the compliance exposure make it necessary to approach this problem in a more structured and systematic way.

3.2 Four Operational Failure Points: Analysis of typical unautomated recoupment practice reveals four recurring failure modes that ITORS is specifically designed to eliminate.

3.2.1 Absent consent documentation: In many organizations, the recoupment policy is shared during onboarding, but there is no record of consent at the time when the employee actually takes leave that creates a negative balance. In states where written authorization is required at the time of the transaction, this creates a problem, as the employer may not have the documentation needed to support the deduction (CBIA, 2024; Paylocity, 2025).

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3.2.2 Non-compliant deduction calculations: Final pay check deductions are often calculated using a standard approach across all employees, without considering state specific rules. This can lead to situations where deductions fall below minimum wage requirements or are treated as invalid under state law. In some cases, the legal risk created by this approach can be greater than the amount being recovered (Bohr, 2023; Nolo, 2023; Klein et al., 2023).

3.2.3 Missed recovery window at separation: When absence tracking and payroll systems are not fully connected, there can be delays in sharing information. As a result, the payroll team may not be aware of a negative leave balance when processing the final paycheck. Once the final check is issued, the opportunity to recover the amount through payroll is often lost (Payroll Partners, 2025; Turner, 2025).

3.2.4 Costly and incomplete post-separation recovery: If the amount is not recovered during the final paycheck, organizations may try to collect it after the employee has left. This usually involves contacting the former employee, tracking the amount owed, and sometimes taking legal action. In many cases, the cost of these efforts is close to or higher than the amount being recovered, and the success rate is relatively low compared to recovering the amount during payroll processing (HRMorning, 2025). The objective of this research is to design ITORS, the Intelligent Time Off Recoupment System, as a unified solution that brings together HR policy management, real time leave tracking, employee consent capture, compliant payroll deduction calculation, and structured compliance reporting. The system is designed as an event driven architecture that aims to improve recovery at the time of separation while meeting federal and state requirements and maintaining transparency with employees throughout the process (Mercer, 2024).

Overall, these problems show that PTO recoupment is not just a payroll task but a structured business process that needs better control and automation. Without a proper system, organizations face financial losses, compliance risks, and process gaps. This is why a unified and automated approach like ITORS is needed to manage the full process in a consistent and compliant way.

4. METHODOLOGY

This paper uses a design science research approach. The main goal is to design and describe a working system that solves a real business problem, rather than testing a hypothesis. This approach is suitable because PTO recoupment is a practical problem in organizations, and there is currently no fully automated solution that handles it well (Hevner et al., 2004).

The design process began by studying where current PTO recovery practices fail. This was done by reviewing HR and payroll guidance, legal sources, and academic research on HR systems and fairness in decision-making. From this review, four main problems were found: missing employee consent records, incorrect deduction calculations, delays in recovering money at the time of employee exit, and expensive recovery after employees leave. These four problems became the main requirements for designing the ITORS system.

Next, the compliance framework was created by studying wage deduction laws across all 50 U.S. states. This included state labor laws, Department of Labor rules, and legal summaries. Each state was reviewed based on three things: whether deductions are allowed, what type of employee consent is required, and what minimum wage protections apply. From this, three main rule patterns were identified. The Payroll Recoupment Engine uses these patterns to apply the correct rules based on where the employee works.

Finally, the five ITORS components were designed so that each one solves one or more of the identified problems. The full system was then checked by walking through a complete employee journey, from onboarding to final paycheck, to make sure all failure points were addressed and all legal requirements were followed.

5. PROPOSED SYSTEM ARCHITECTURE

This section explains the design of the ITORS system. It shows how the system is structured using five main components and how each component works together in a sequence. It also explains how ITORS connects with existing HR, payroll, and HCM systems to manage PTO tracking, employee consent, payroll deductions, and compliance reporting in a clear and automated way.

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5.1 Summary of ITORS Components: ITORS is made up of five distinct components that operate in a specific trigger sequence. Each component receives input from the previous step and passes structured output to the next. The system is designed to integrate on top of existing HCM platforms rather than replace core HR or payroll systems. Table 1 below summarizes each component and its main integration points.

Table 1: ITORS Component Summary

#	Component Name	Code	Primary Function	Integration Layer
1	HR Policy Engine	HRPE	Policy repository and state compliance rule matrix	HR handbook / policy CMS
2	Absence & Balance Monitor	ABM	Real-time PTO ledger and negative-balance trigger	Absence / time management module
3	Consent Workflow Module	CWM	Employee notification and digital consent capture	Notification system / self-service portal
4	Payroll Recoupment Engine	PRE	Compliant deduction calculation at separation	Payroll processing module
5	Compliance Reporting Hub	CRH	Four structured reports to four stakeholder groups	Reporting layer / data warehouse

5.2 System Architecture and Workflow Diagram: The ITORS workflow, shown in Figure 1, moves from left to right through components 1 to 5. Each component activates based on its trigger and passes structured data downstream. The Compliance Reporting Hub consolidates all data and distributes four types of reports to four stakeholder groups.

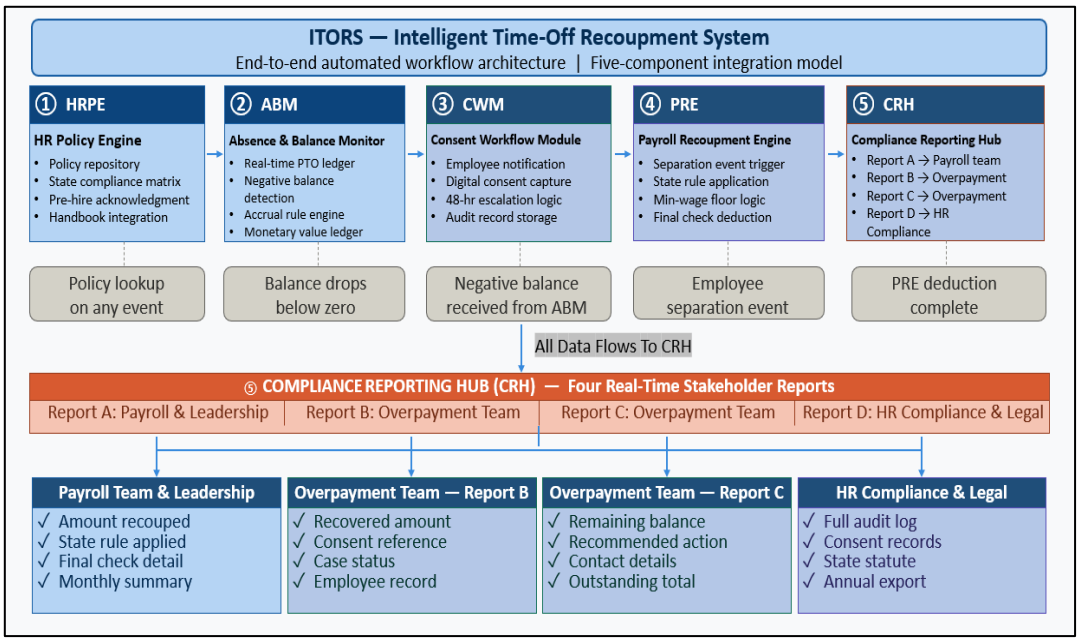

Figure 1: Intelligent Time Off Recoupment System data flow

5.2.1 HR Policy Engine (HRPE): Maintains the organization's PTO recoupment policy and a compliance matrix for all 50 US states. Policies are communicated to employees before any leave advance.

5.2.2 Absence & Balance Monitor (ABM): Tracks real-time leave balances. When a balance goes negative, it triggers the consent workflow.

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5.2.3 Consent Workflow Module (CWM): Notifies employees of their negative balance in hours and dollars and requests digital acknowledgment. Signed consent is recorded with timestamp and policy version.

5.2.4 Payroll Recoupment Engine (PRE): Activates when an employee separates. It calculates the maximum allowable deduction based on state compliance rules and applies it to the final paycheck while respecting minimum wage protections.

5.2.5 Compliance Reporting Hub (CRH): Consolidates all upstream data and produces four structured reports: recoupment summaries for Payroll and Leadership, recovery details for the Overpayment Team, remaining balances, and full audit logs for HR Compliance and Legal.

In summary, ITORS provides an automated, policy-driven framework for accurate tracking, compliant recovery, and clear communication across the employee lifecycle. By integrating real-time monitoring, consent management, jurisdiction-specific compliance, and payroll execution, the system reduces manual work and legal risk while improving efficiency. The Compliance Reporting Hub supports governance by giving timely insights to all stakeholders.

5.3 Component-Level Design: The overall architecture includes several components, each performing multiple designated tasks as explained in this section below:

5.3.1 HR Policy Engine (HRPE): The HRPE is the system's governance backbone. It keeps a versioned repository of the PTO recoupment policy and a compliance matrix keyed by state. This matrix defines deduction rules, consent requirements, minimum wage floors, and applicable statutes. PRE queries this matrix for every final-check calculation, ensuring compliance is centralized. HRPE also logs employee acknowledgment before any advance is granted, meeting the FLSA prior-communication requirement (DOL, 2004).

5.3.2 Absence and Balance Monitor (ABM): ABM connects to the time management system to maintain a real-time leave ledger for each employee, tracking accrued, used, and net balances. When a balance goes negative, ABM fires an event containing the employee ID, negative hours, monetary equivalent, and timestamp, which triggers CWM. ABM also keeps a running record of each employee's outstanding PTO obligation, which PRE uses at separation (CloudApper, 2026).

5.3.3 Consent Workflow Module (CWM): CWM ensures legal defensibility and trust. On receiving a balance event, it notifies the employee via their preferred channel. Notifications include negative balance hours, monetary value, policy references, and a one-click digital acknowledgment. Consent records are stored with a cryptographic hash, UTC timestamp, device ID, and policy version, meeting requirements in states like Connecticut, Arizona, New York, and Washington (CBIA, 2024; Bohr, 2023; Paylocity, 2025). Non-response within 48 hours triggers HR escalation.

5.3.4 Payroll Recoupment Engine (PRE): PRE retrieves the employee's current obligation from ABM and queries HRPE for state-specific rules and minimum wage floors. It calculates gross final pay, determines the minimum protected amount (minimum wage × hours worked), computes the maximum permissible deduction, and applies the lesser of the obligation and the cap. PRE then sends the deduction, any remaining balance, and audit trail to CRH. An illustrative example would be, an hourly employee in Washington earning $28/hour works 36 hours in the final pay period. Gross pay is $1,008. Minimum wage is $16.28/hour, so minimum protected amount is $585.08. Maximum deduction is $422.92. If negative PTO is $336, it is fully deducted. Net pay check is $672 with zero remaining balance.

5.3.5 Compliance Reporting Hub (CRH): The CRH consolidates PRE outputs and generates four reports within sixty minutes of each separation event. Report A delivers recoupment summary data with total amount recovered, deduction method, state rule applied, and net final check, then to the Payroll Team and Leadership. Report B delivers the recovered amount, employee record, and consent reference to the Overpayment Recovery Team. Report C delivers the remaining outstanding balance and recommended next action to the same team. Report D delivers the full audit log, including consent timestamps, policy version,

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state statute applied, and the PRE decision trail to HR Compliance and Legal on demand and as an annual audit export.

5.4 End-to-End Process Flow Diagram: Figure 2 below presents the ITORS end-to-end process flow mapped across four owning systems. Unlike Figure 1, which illustrates the five-component architecture in horizontal trigger sequence, Figure 2 traces the full operational lifecycle of a single PTO recoupment event, from employee onboarding through to final paycheck issuance and compliance reporting, using a top-down flowchart with system boundary annotations. Each dashed boundary identifies the owning system responsible for that stage of the process, making the inter-system data dependencies explicit for implementation teams.

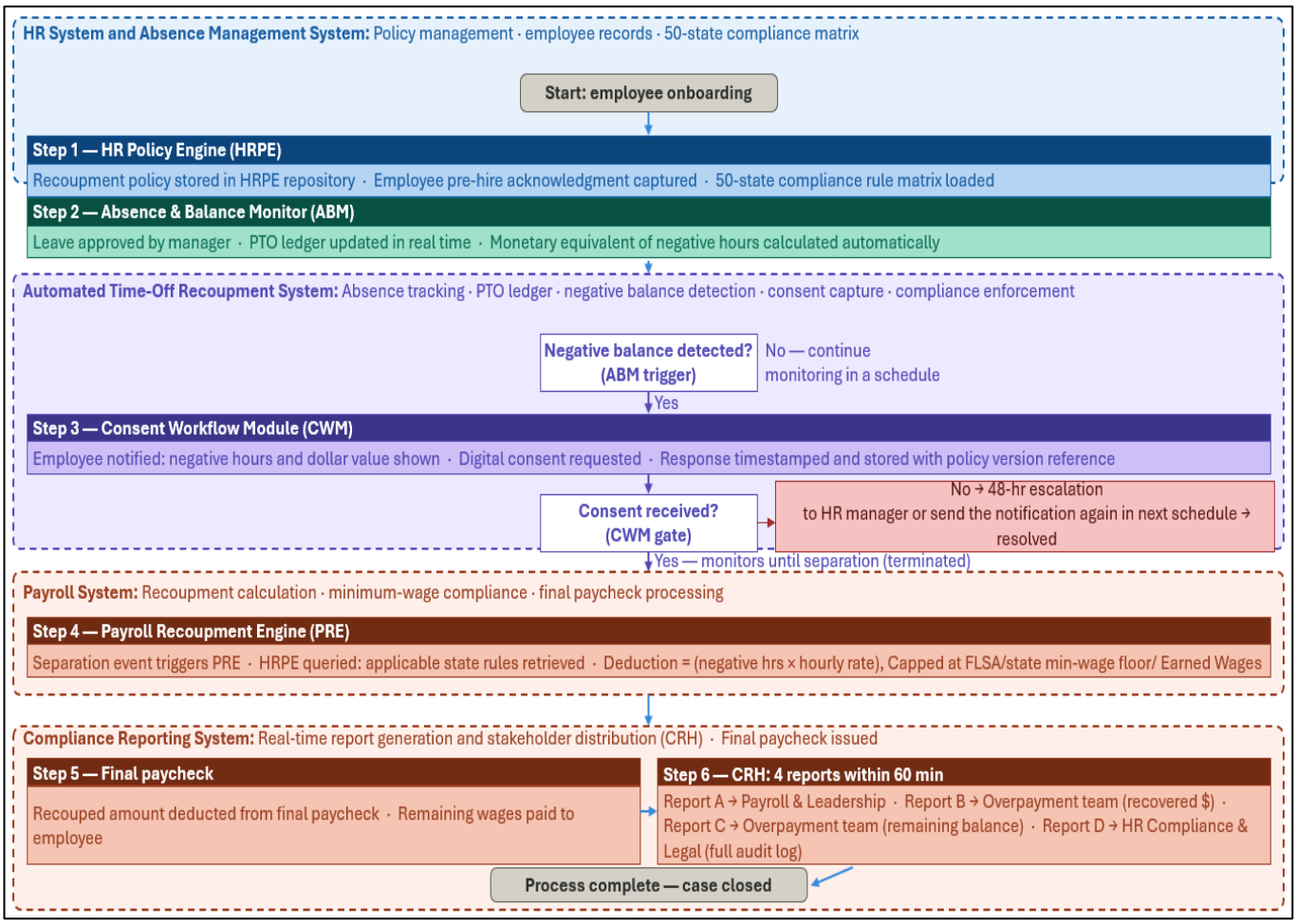

Figure 2: Time Off Recoupment Process Flow

The process flow comprises six sequential steps distributed across four system boundaries, with two decision gates and one exception-handling path embedded within the flow.

5.4.1 HR Policy Engine in HR System: The process begins at employee onboarding, before any PTO advance has been granted. The HRPE stores the organization's recoupment policy, captures the employee's pre-hire acknowledgment, and loads the applicable 50-state compliance rule matrix. This step ensures that consent is structural and prospective rather than reactive, establishing legal defensibility for any future deduction from the first day of employment.

5.4.2 Absence & Balance Monitor through Time-Off Management & Recoupment System: When a leave request is approved, the ABM updates the employee's PTO ledger in real time and calculates the monetary equivalent of any negative balance. The flow then reaches its first decision gate: if no negative balance is detected, the ABM continues passive monitoring. If a negative balance is detected, the process

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advances to the consent workflow. This gate ensures the consent and recoupment machinery is activated only when an actual financial liability exists, avoiding unnecessary employee notifications.

5.4.3 Consent Workflow Module through Time-Off Management & Recoupment System: The CWM notifies the employee of the negative balance, displaying both the hours owed and the precise dollar value of the obligation. A digital consent acknowledgment is requested, confirming the employee's awareness that the employer may recover this amount from a future final paycheck. The response is timestamped and stored alongside the applicable policy version reference. The second decision gate governs this step: if consent is received, the system records the acknowledgment and the ABM continues monitoring the balance through the remainder of the employee's tenure. If consent is not received within the designated window, a 48-hour escalation is automatically routed to the HR manager for resolution before the process continues. This exception path ensures that no separation event proceeds to payroll deduction without documented consent on file.

5.4.4 HR system to Payroll System: A separation event triggers the PRE. The engine queries the HRPE for the employee's state-specific compliance rules, calculates the recoupment amount as the product of negative hours and the applicable hourly rate, and applies the statutory minimum wage floor cap to ensure the final paycheck does not fall below the federal or state minimum wage threshold. This calculation sequence implements the dual compliance requirements of FLSA and applicable state wage deduction statutes simultaneously.

5.4.5 Final Paycheck Issuance through Payroll System: The calculated recoupment deduction is applied to the employee's final paycheck. The recouped amount is withheld and the remaining wages are disbursed. The paycheck transaction and deduction detail are passed to the Compliance Reporting System for distribution.

5.4.6 Compliance Reporting Hub: Within sixty minutes of final paycheck processing, the CRH generates and distributes four structured reports: Report A delivers the total recouped amount and deduction detail to the Payroll Team and Leadership; Report B delivers the recovered amount and consent reference to the Overpayment Recovery Team; Report C delivers any remaining outstanding balance and recommended next action to the same team; and Report D delivers the full audit log, including consent timestamps, policy version, and state statute applied, to HR Compliance and Legal. If a remaining balance is identified in Report C, the Overpayment Recovery Team initiates a direct recovery process. Once all balances are resolved, the case is closed.

In summary, the ITORS process flow begins at onboarding, where the HR System captures policy acknowledgment, progresses through real-time balance monitoring and consent capture in the Time-Off Management & Recoupment System, executes a compliant minimum-wage-capped deduction through the Payroll System at separation, and concludes with the Compliance Reporting System distributing four structured reports to stakeholders, ensuring every recoupment is legally defensible, automatically calculated, and fully auditable from first advance to final paycheck.

6. COMPLIANCE FRAMEWORK

One of the most important requirements of any PTO recoupment system is compliance with payroll and wage laws. In the United States, employers must follow both federal regulations and state-specific requirements when recovering advanced PTO from an employee's final paycheck. These rules can vary significantly from one state to another, making manual administration difficult and increasing the risk of compliance errors. To address this challenge, ITORS includes built-in compliance controls that apply the appropriate federal and state rules automatically during the recoupment process.

6.1 Federal Compliance: ITORS satisfies the two FLSA conditions for permissible final-check deductions through structural design. The HRPE pre-hire communication workflow satisfies the requirement that the policy must have been communicated before any advance is granted (DOL, 2004). The PRE's rate-matching logic satisfies the requirement that deductions be made at the employee's actual hourly rate. For exempt employees, the PRE applies a

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separate calculation path enforcing full-day increment constraints under FLSA Section 541.602(b) and routes edge cases to an HR review queue to prevent inadvertent salary basis violations (DOL, 2023).

6.2 State Compliance Matrix: The HRPE compliance rule matrix covers all fifty US states. Table 2 presents eight representative jurisdictions illustrating the breadth of variation the PRE must handle at runtime.

Table 2: Representative State Compliance Rules in the HRPE Matrix from Rippling (2025), Paylocity (2025), Bohr (2023), and Nolo (2023)

State	Deduction Permitted	Consent Requirement	Min. Wage Floor	Relevant Statute
California	Limited, written agreement required	Written agreement before advance	CA state minimum wage	Cal. Labor Code §§ 221–224
Connecticut	Only 5 enumerated categories	State Labor Commissioner-approved form	Yes	C.G.S. § 31-71e
New York	Yes, with written consent	Written consent at or before advance	NY state minimum wage	NY Labor Law § 193
Texas	Yes, with written agreement	Written agreement	Federal or state minimum wage	TX Labor Code § 61
Florida	Yes, follows FLSA	Recommended; not mandated	Federal minimum wage	FLSA (no state wage act)
Arizona	Yes, subject to minimum wage cap	Written consent	AZ state minimum wage	A.R.S. § 23-351
Washington	Within 90 days of overpayment	Written consent	WA state minimum wage	RCW 49.48.010
Illinois	Yes with written consent	Written consent	IL state minimum wage	820 ILCS 115/9

The compliance matrix serves as the foundation for state-specific decision making within ITORS. While many states allow PTO recoupment with written employee consent, the specific requirements differ regarding authorization, deduction limits, minimum wage protections, and documentation standards. By maintaining these rules in a centralized compliance matrix, the HR Policy Engine can provide the Payroll Recoupment Engine with the correct requirements for each employee based on their work location. This approach helps organizations apply deductions consistently, reduce compliance risk, and adapt more easily to future regulatory changes.

7. IMPLEMENTATION DESIGN

This section explains how ITORS can be implemented in existing ERP and HCM systems. The framework is designed to work with current HR, payroll, and time management platforms through standard integrations. It also provides a phased implementation approach and employee communication process to support compliance, efficiency, and successful adoption.

7.1 ERP and HCM Platform Integration: ITORS integrates with existing platforms through documented API patterns rather than requiring replacement of core HR or payroll infrastructure. Table 3 summarises the recommended integration approach for the five most widely deployed HCM environments in US enterprises.

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Table 3: Platform Integration Pattern and Recommended Approach

HCM Platform	Integration Mechanism	Key Technical Touchpoints
Workday HCM	Workday Studio + REST/SOAP APIs	Absence Management API; Payroll Deduction API; Notifications API; Worker Data API for separation events
Oracle HCM Cloud	Oracle Integration Cloud (OIC) + Fast Formula	HCM Extracts for balance data; Fast Formula for state-specific deduction logic; HDL for data writeback
SAP SuccessFactors	SAP BTP Integration Suite	Time Management API; Employee Central Payroll API; SAP Build Process Automation for consent workflow
ADP Workforce Now	ADP Marketplace REST API	Time & Attendance API; Payroll Deduction API; Document Management API for consent storage
Custom	REST API layer + webhook architecture	Webhook on negative-balance event; REST deduction endpoint; scheduled report generation API

7.2 Phased Implementation Roadmap: A phased rollout distributes implementation risk and allows each component to be validated independently before the next is activated, as shown in Table 4 below.

Table 4: Phased Implementation Roadmap

Phase	Timeline	Scope	Primary Success Metric
1. Foundation	Months 1–3	HRPE policy setup; all 50 state compliance rules configured; ABM integration; negative balance trigger testing	All states configured; trigger fires correctly in test environment
2. Consent Automation	Months 4–6	CWM deployment; notification templates; legal review of consent language; 48-hour escalation logic	≥ 95% employee acknowledgment within 48 hours of trigger
3. Payroll Integration	Months 7–9	PRE deployment; minimum wage floor logic validation by state; final-check integration; parallel-run testing	Zero final checks processed below applicable state minimum wage
4. Reporting & Go-Live	Months 10–12	CRH deployment; all four report templates configured; end-to-end integration test; production launch	All four reports delivered within 60 minutes of each separation event

7.3 Employee Communication Design: The consent notification sent by the CWM is designed to meet two goals at the same time: it must be legally precise enough to meet the requirements of states that mandate specific wording, and it must be easy for employees to understand without specialized knowledge. Research in procedural justice (Adams, 1965) shows that employees are more likely to accept compensation-related decisions when the communication is clear, specific, and delivered before the outcome rather than simultaneously with it. By sending a notification on the day a negative balance occurs, which includes the exact hours, monetary value, policy reference, and a one-click acknowledgment option, the system frames the future final-check deduction as a pre-agreed

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obligation rather than an unexpected penalty. This approach ensures that the original employee experience benefits of advanced PTO are preserved.

Overall, ITORS can be implemented using existing enterprise technology without replacing core HR or payroll systems. The phased rollout approach helps reduce implementation risk, while clear employee communication and automated compliance controls support a smooth and effective deployment.

8. RESULTS AND DISCUSSION

This section presents the results of the ITORS design and explains how the system addresses key problems in advanced PTO recovery. It also discusses how the system improves compliance, reduces errors, and supports better integration between HR and payroll systems.

8.1 System Design Results: The ITORS design addresses each of the four failure points described in Section 3. The first failure was that most organizations do not have a signed consent record at the time an employee actually takes leave that creates a negative balance. ITORS fixes this through two components working together. The HR Policy Engine captures a written acknowledgment from the employee at onboarding, before any leave advance ever happens. Then, when a negative balance occurs later, the Consent Workflow Module sends a direct notification to the employee showing exactly how many hours are owed and what that equals in dollars, and asks for a one-click digital acknowledgment at that moment. Together, these two steps ensure there is always a documented, timestamped record that meets what states like Connecticut, New York, Arizona, Washington, and Illinois specifically require. The second failure was that final paycheck deductions were often calculated using a one-size-fits-all approach, without checking what the employee's state actually allows. The Payroll Recoupment Engine solves this by looking up the employee's state at the time of separation and applying the correct rules from the compliance matrix before any deduction is calculated. It checks the applicable minimum wage floor and makes sure the deduction never brings the employee's net pay below that threshold. This happens automatically, without anyone needing to manually look up state law. The third failure was timing. When absence tracking and payroll systems are disconnected, the payroll team often does not know about a negative balance when processing the final check. The Absence and Balance Monitor prevent this by tracking leave balances in real time and immediately flagging a separation event if an outstanding balance exists, so payroll always has the information it needs before the final check is issued. The fourth failure was the cost and difficulty of recovering amounts after someone has already left. The Compliance Reporting Hub addresses this by generating four structured reports within 60 minutes of each separation event. One of those reports goes directly to the Overpayment Recovery Team with the remaining balance and recommended next steps, so any amount that could not be recovered through payroll is handed off immediately rather than discovered weeks later. The end-to-end process flow in Figure 2 shows how all of this works across four systems. Two decision gates are built into the flow to make sure no deduction moves forward without a verified consent record. The result is a process that is traceable from the first day of employment through to the final paycheck.

8.2 Compliance Framework Results: The 50-state compliance matrix built into the HR Policy Engine is what allows the Payroll Recoupment Engine to apply the right rules for each employee automatically. After mapping all 50 states, three broad patterns emerge in how state law treats PTO recoupment. The first pattern covers the most restrictive states. California does not allow employers to treat advanced PTO the same as other wage advances, accrued vacation is considered earned wages under state law, which means any recoupment requires a written agreement signed before the leave was taken. Connecticut goes even further, limiting paycheck deductions to five specific categories defined by the state and requiring a consent form that has been approved by the state Labor Commissioner. Both states require significant documentation before any deduction can legally proceed. The second pattern covers the majority of states, including New York, Texas, Arizona, Washington, and Illinois. These states allow deductions for PTO recoupment as long as the employee gave written consent and the deduction does not push the final paycheck below the applicable minimum wage. The details vary; Washington has a 90-day window for correcting overpayments, while Illinois requires specific written consent language, but all of these states follow the same basic framework of consent plus minimum wage protection. The third pattern applies in states like Florida that have no state-specific wage deduction law. In these states, federal FLSA rules apply directly, which means the employer must have communicated the policy before any advance was given and must calculate the deduction at the employee's actual hourly rate. There are fewer procedural steps, but the same federal requirements still apply. The

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Payroll Recoupment Engine handles all three patterns through a single calculation process. The illustrative example in Section 5.3.4 shows how this works in practice: a Washington-state employee earning $28 per hour works 36 hours in their final pay period. Gross pay is $1,008. The state minimum wage of $16.28 per hour means $585.08 of that pay is legally protected. The maximum allowable deduction is therefore $422.92. If the employee owes $336 in advanced leave, the full amount is recovered and the employee still receives $672 in their final check. The calculation is done automatically without any manual input from payroll staff. The platform integration table in Section 6.1 shows that this same logic can be applied across Workday, Oracle HCM Cloud, SAP SuccessFactors, ADP Workforce Now, and custom systems using standard API connections. No existing payroll or HR system needs to be replaced.

8.3 Theoretical and Practical Contributions: This paper offers three contributions to research on HCM system design and payroll automation. First, it formally recognizes time-off recoupment as a separate enterprise process that requires dedicated system architecture, a perspective largely missing from existing literature. Second, it shows how real-time consent automation, a practice already proven in financial services and healthcare, can be adapted to HR compliance contexts. This design satisfies legal requirements while supporting procedural fairness (Adams, 1965). Third, the paper provides a practical, implementable system specification that bridges the gap between theoretical automation concepts and the realities of complex, multi-state legal environments. From a practical perspective, the financial case is clear. Without automated recoupment, negative PTO balances at separation are mostly unrecovered. Delays in identifying balances, missing consent records, and cumbersome post-separation collection mean employers usually absorb the full cost. ITORS replaces this outcome by automatically recovering the maximum legally allowable amount through the final pay check, eliminating manual steps and maintaining a complete audit trail that shields the organization from compliance risk associated with incorrect manual deductions (Nawaz et al., 2024; Cabane & Farias, 2024).

8.4 Limitations: This study is limited to a design-level contribution and does not include empirical evaluation of a deployed ITORS system. The compliance matrix reflects U.S. wage law as of the time of writing, but state statutes change regularly, requiring periodic review to maintain accuracy. The framework is limited to U.S. jurisdictions; extending it internationally would require additional compliance layers tailored to local employment laws. Additionally, calculations for exempt employees may involve legal edge cases, meaning some high-value deductions may still require individual legal review rather than fully automated processing.

8.5 Future Research Directions: Three directions for future research are suggested. First, empirical validation through before-and-after studies could measure recoupment recovery rates, compliance incidents, and employee satisfaction in organizations implementing ITORS, providing real-world evidence of its value. Second, predictive functionality could be added: machine learning models could use leave usage and turnover data in ABM to flag flight-risk employees with negative balances, allowing proactive retention measures before separation occurs (Koritnik et al., 2024; Nath et al., 2022; Guerranti & Dimitri, 2023). Third, the architecture could be extended beyond PTO to other employee advances, such as relocation allowances, clawback-enabled signing bonuses, and tuition reimbursement programs with service commitments. This would create a generalized framework for intelligent recovery of contingent compensation across multiple types of obligations (Pan & Froese, 2023).

Overall, the results show that ITORS provides a clear and structured way to manage PTO recoupment across different states and systems. It improves compliance, reduces manual effort, and makes the process more reliable and transparent. The discussion also highlights the practical value of the system and suggests areas for future improvement.

9. CONCLUSION

Advanced paid time off is a critical tool for improving employee satisfaction and retention, yet it creates a financial and compliance challenge that most organizations are not equipped to manage efficiently. When employees take leave before earning it and then depart with a negative balance, employers must recover the overpaid amount in a way that meets a complex mix of federal and state wage laws. Many organizations face difficulty because absence tracking and payroll systems are not integrated, employee consent is not captured in a legally defensible manner, and final paycheck deductions are calculated without applying jurisdiction specific rules. Industry surveys confirm this challenge: seventy percent of U.S. employers report compliance issues related to paid leave expansion (Benefits

Canada, 2024), and Mercer (2024) found that almost seven in ten employers cite state and local leave mandates as a significant concern. HR Brew (Vinopal, 2026) and Forbes (Turner, 2025) also document growing administrative burdens associated with multistate leave compliance, highlighting the practical need for automated, reliable solutions.

This paper demonstrates that the problem is structural rather than merely administrative. ITORS provides a comprehensive enterprise architecture that automates the entire recoupment lifecycle. By combining real time balance monitoring, employee consent capture, jurisdiction specific payroll calculations, and structured compliance reporting, ITORS maximises lawful recovery, ensures procedural fairness, and preserves employee trust. The system also addresses each of the four operational failure points observed in unautomated practice, reducing risk and administrative cost while maintaining transparency and audit readiness.

The importance of this system is reinforced by real world examples and legal analysis. Paid time off compliance remains a priority for organizations as state and federal regulations evolve, and recent court decisions clarify the treatment of PTO under the FLSA for exempt employees (Klein et al., 2023; Thurston, 2023). Without a structured, automated approach, organizations continue to absorb financial losses and compliance risk, limiting their ability to scale advanced PTO policies safely. ITORS provides a replicable framework to meet these challenges, demonstrating that organizations can deliver valuable employee benefits while maintaining responsible financial and legal management.

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