Tokenized Assets: Own $50 of a Building

Module 3: The Trust Problem — Companion Lecture

Prof. Dr. Joerg Osterrieder

Digital Finance — BSc Course

Companion lecture — explores how blockchain-based tokens can unlock the world's most illiquid assets for ordinary investors.

Why is $326 trillion in real estate locked behind six-figure minimums and 90-day sales?

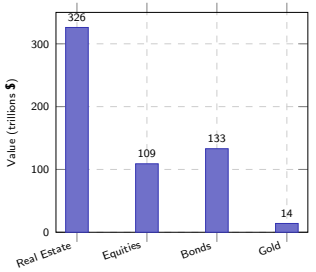
Global real estate — the largest asset class:

- Estimated $379 trillion total value in 2022 (Source: Savills World Research, 2023)
- Larger than all stocks and bonds combined
- Average transaction takes 30–90 days to close
- Minimum investment typically $100K–$500K

Why it stays illiquid:

- **High minimums:** a single apartment costs more than most people's savings
- **Legal complexity:** title transfers, notary, land registry
- **Geographic lock-in:** you can only inspect and manage nearby properties
- **Slow settlement:** weeks of due diligence, financing, closing
- **Concentration risk:** one building = one bet

Key insight: Real estate is the world's largest asset class, yet most people can only invest in it through their own home or expensive REITs (REIT = Real Estate Investment Trust, a company that owns income-producing real estate and sells shares to investors).



Paradox: The largest asset class is also the least divisible. You cannot buy $500 of a building the way you buy $500 of Apple stock.

Source: Savills World Research "The Value of Global Real Estate" (2023); SIFMA Capital Markets Fact Book for equities/bonds.

Real estate's illiquidity means most investors are locked out entirely, concentrated in one property, or paying high REIT management fees.

Imagine buying a piece of a skyscraper for $50 and receiving rent every month

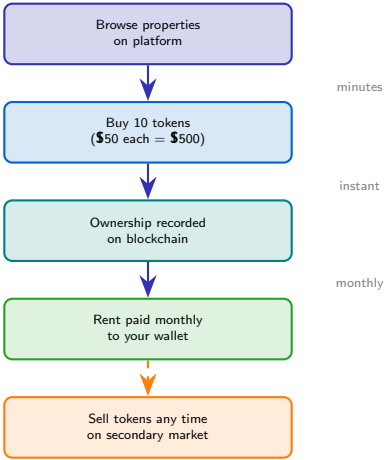
The vision:
It is Wednesday evening. You open an app, browse tokenized properties across three continents, and buy 10 tokens representing a share of an apartment building in Detroit for $50 each.

What happens next:

- Monthly rent distributions arrive in your wallet as stablecoins
- You can track occupancy, expenses, and income on-chain
- You can sell your tokens any time — no 90-day waiting period
- Your ownership is recorded on a blockchain, not in a paper registry

Compare to traditional real estate:

- No mortgage application
- No notary, no land registry visit
- No property management headaches
- Diversify across 20 buildings instead of betting on one



The promise: Real estate investing with the simplicity of buying stock.

Tokenization turns illiquid real estate into divisible, tradeable digital assets — lowering the entry barrier from hundreds of thousands to tens of dollars.

How does tokenization turn a physical building into tradeable digital tokens?

Definition: Real Estate Tokenization

The process of creating blockchain tokens that represent fractional ownership claims on a property, where each token entitles the holder to a proportional share of rental income and capital appreciation.

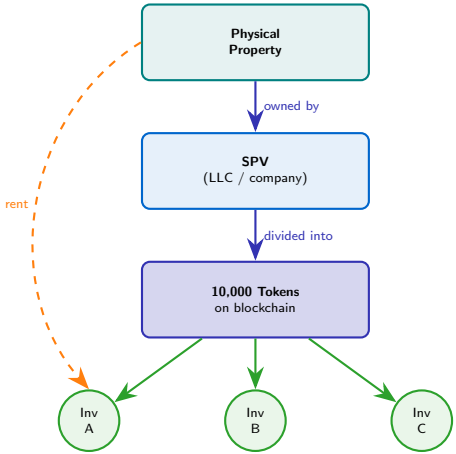
The legal structure:

1. **Property acquisition:** a company (Special Purpose Vehicle, or SPV) buys the building
2. **SPV tokenization:** ownership of the SPV is divided into blockchain tokens
3. **Token distribution:** tokens are sold to investors on a platform
4. **Rent distribution:** property manager collects rent, converts to stablecoins, distributes pro-rata

What a token represents:

- Proportional claim on rental income
- Proportional claim on sale proceeds
- Not direct property ownership — ownership is via the SPV

Key insight: You do not "own" the building. You own a token representing



SPV = Special Purpose Vehicle: a legal entity created solely to hold one property and issue tokens.

How has RealT tokenized 400+ properties with 8–10% yields and a $50 minimum?

RealT platform overview (Source: realt.co, 2026):

- Founded 2019, based in the United States
- 400+ single-family homes and small multi-family properties
- $100 million in total tokenized value
- Minimum investment: $50 per token
- Rent paid weekly in USDC or xDAI stablecoins

Metric	REIT	RealT
Minimum	$500+	$50
Yield (avg)	3–5%	7–10%
Liquidity	Stock mkt	Token mkt
Diversification	100s props	1 per token
Transparency	Quarterly	Real-time
Mgmt fee	1–2%	1–1.5%
Settlement	T+2	Minutes
Geography	Global	US Midwest

Yield characteristics:

- Gross rental yield: typically 8–12%
- After management fees (1–1.5%) and platform fee (0.5%): net 7–10%
- Properties are primarily in Detroit, Chicago, and other Midwest US cities
- Higher yields reflect higher property risk and lower property values

Caveat: Higher yields on RealT properties reflect higher risk — lower-value buildings in economically challenged cities. This is not a free lunch.

How it works legally:

- Each property held in its own LLC (US SPV)
- Tokens represent LLC membership interests
- Regulated under Reg D (accredited) and Reg S (non-US) exemptions

RealT shows tokenized real estate can work at scale — but higher yields come from higher-risk properties, not from tokenization magic.

Worked example: buy tokens in a $500K property and calculate your net yield

Property: 4-unit apartment building, Detroit, MI

Tokenization:

- Property value: $500,000
- Tokens issued: 10,000 at $50 each
- Your investment: 20 tokens = $1,000
- Your ownership share: 20 / 10,000 = 0.2%

Annual income calculation:

- 4 units × $750/month = $36,000 gross annual rent
- Per token: $36,000 / 10,000 = **$3.60/token/year**
- Gross yield: $3.60 / $50 = **7.2%**

Fee deductions:

- Property management (1.5%): –$7,500
- Platform fee (0.5%): –$2,500
- Maintenance reserve (1.0%): –$5,000
- Net income: $36,000 – $15,000 = $21,000
- Net yield: $21,000 / $500,000 = **4.2%**

Your 20 tokens earn: $21,000 × 0.002 = **$42/year** ($3.50/month)

Item	Amount
Gross rent	$36,000
Property mgmt (1.5%)	–$7,500
Platform fee (0.5%)	–$2,500
Maintenance (1.0%)	–$5,000
Net income	**$21,000**
Gross yield	7.2%
Net yield	**4.2%**

Comparison:

- Tokenized net yield: 4.2%
- US REIT average: 3.5–4.5%
- Bank savings: 0.5–1.0%
- S&P 500 dividend yield: 1.5%

Key insight: After fees, tokenized real estate yields are competitive with REITs — the advantage is the $50 minimum and blockchain transparency, not higher returns.

What can go wrong when you connect physical buildings to blockchain tokens?

The oracle problem — the fundamental challenge:

- Blockchain is immutable, but who verifies the building exists?
- Who confirms it has not burned down, been condemned, or been sold?
- Token on blockchain says "you own 0.2%" — but what enforces that claim in the real world?

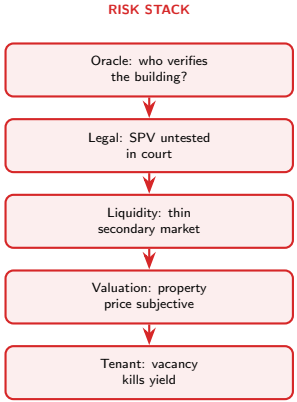
Legal risks:

- SPV structure untested in bankruptcy across jurisdictions
- Token holder rights vary by country
- Regulatory classification unclear: security? property? utility?

Market risks:

- **Thin liquidity:** secondary markets have few buyers
- **Valuation opacity:** property values are subjective
- **Concentration:** small platforms hold few properties
- **Tenant default:** vacancy directly reduces your yield

Warning: Tokenization makes buying easy but does not eliminate any traditional real estate risk.



Blockchain guarantees token ownership is immutable — but it cannot guarantee that the physical asset behind the token is safe, occupied, or legally yours.

Where is tokenized real estate today — platforms, regulations, and market size?

Market size (Source: rwa.xyz, 2026):

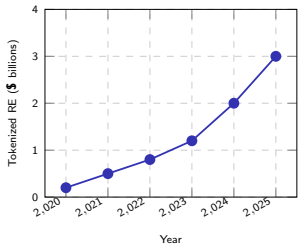
- $3–5 billion in tokenized real estate globally (rwa.xyz)
- Compared to $379 trillion total real estate: roughly 0.001%
- Growing rapidly but from a very small base

Key platforms:

- **RealT:** 400+ US residential properties, $50 min
- **Lofty:** US properties, fractional with governance rights
- **Propy:** End-to-end blockchain title transfers
- **Centrifuge:** Real-world asset lending protocol
- **Ondo Finance:** Tokenized treasuries and real estate funds

Regulatory landscape:

- **Switzerland:** DLT Act (2021) enables tokenized securities
- **Liechtenstein:** Token and TT Service Provider Act
- **EU:** MiCA framework, DLT Pilot Regime
- **US:** SEC Reg D/S exemptions, no specific token framework



Source: rwa.xyz. Growth is strong in percentage terms but the absolute market remains small.

Switzerland leads: The DLT Act explicitly recognises blockchain-based securities, making it one of the most favourable jurisdictions for tokenized real estate.

Tokenized real estate is growing rapidly but remains a niche — $3B tokenized versus $326T total market. Regulation is the main growth bottleneck.

Is tokenized real estate genuine democratisation or just marketing for the same assets?

The democratisation argument:

- **Lower minimums:** $50 vs $100K+ for direct ownership
- **Geographic access:** invest in New York from Nairobi
- **Faster liquidity:** sell tokens in minutes vs 90-day property sale
- **Transparency:** on-chain rent distribution, auditable

The sceptic's argument:

- REITs already offer fractional real estate exposure (since 1960s)
- Token secondary markets are thin — liquidity is theoretical
- Most platforms require KYC, limiting "permissionless" access
- High-yield properties often carry high risk (poor locations)
- Tokenization adds a tech layer but does not change the property's fundamentals

Key insight: Tokenization lowers the investment minimum dramatically. Whether that translates to genuine democratisation depends on liquidity, legal protection, and investor education.

	REITs	Tokens
Minimum	$500	$50
Liquidity	High	Low
Transparency	Quarterly	Real-time
Regulation	Strong	Evolving
Track record	60+ years	<5 years
Diversification	100s	1 per token
Fees	1–2%	1–2%
Legal protection	Strong	Untested

Verdict: Tokenization's main advantage over REITs is the $50 minimum and blockchain transparency. On liquidity, regulation, and investor protection, REITs still win.

Tokenization genuinely lowers barriers to entry — but "democratisation" requires liquidity, legal clarity, and investor protection that do not yet exist at scale.

So what? One sentence to remember about tokenized real estate

Tokenization lowers the minimum from $500K to $50 —

but the “last mile” of connecting tokens

to physical buildings remains unsolved.

Solved by tokenization	Not solved by tokenization	What needs to happen
Fractional ownership ($50)	Oracle problem	Regulatory frameworks
Global access	Thin secondary liquidity	Liquid secondary markets
Blockchain transparency	Legal enforcement	Standardised SPV structures
Faster settlement	Property management	Institutional participation

Tokenized real estate is a genuine innovation in access — but the physical-digital gap and thin liquidity limit its impact today.

Your turn: would you invest $500 in tokenized real estate?

Discussion Question

You have $500 to invest. A platform offers tokenized shares in a Detroit apartment building yielding 7.2% gross (4.2% net after fees).

Would you invest? What due diligence would you do before buying?

- How would you verify the building exists and is occupied?
- What legal protections do you have if the platform shuts down?
- How would you sell your tokens if you need cash?
- How does this compare to buying a REIT ETF for the same $500?

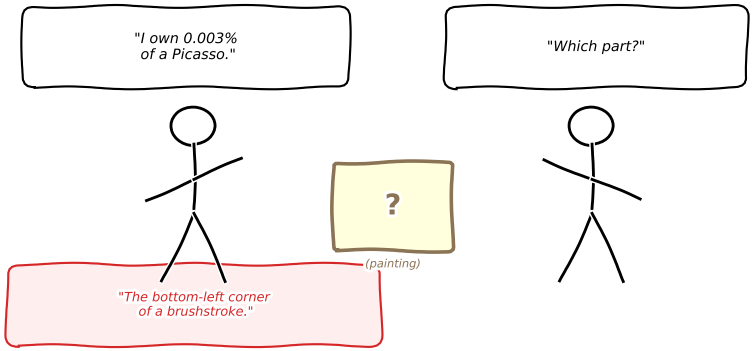
Further Reading

- RealT platform: `realt.co`
- Baum (2021), "Tokenization — The Future of Real Estate Investment?"
- Swiss DLT Act overview: `finma.ch/en/documentation/dlt-act`

Reflection

Tokenization makes real estate investable at $50 — but smart investing still requires the same due diligence as buying a whole building.

Fractional Everything



Fractional Everything: when ownership gets really, really small.

When ownership can be divided into arbitrarily small pieces, what does “owning” something even mean?

Learning Objectives

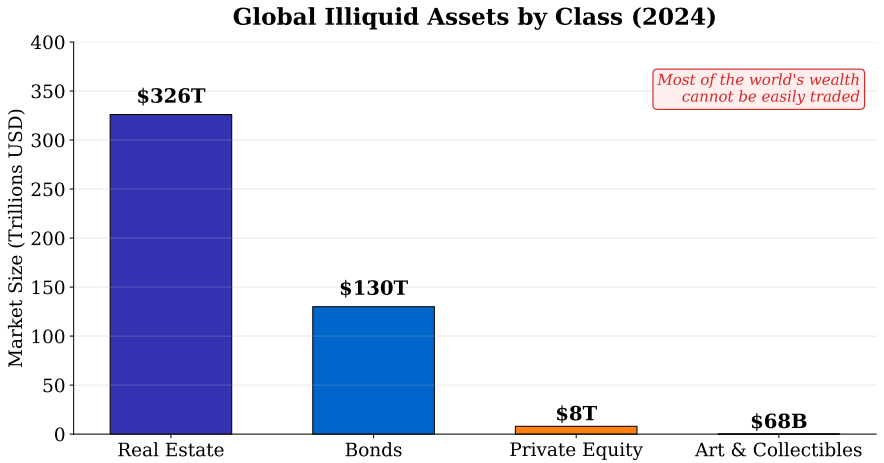
After completing this lecture, you will be able to:

1. **Explain** why $326 trillion in real-world assets remain illiquid and inaccessible to most investors [Understand]
2. **Describe** the tokenization lifecycle (originate, issue, trade, settle, redeem) and the role of SPVs (Special Purpose Vehicles) [Understand]
3. **Calculate** net rental yield and token-level returns for a worked real estate example [Apply]
4. **Compare** tokenized real estate with direct ownership and REITs (Real Estate Investment Trusts) on cost, liquidity, and yield [Analyze]
5. **Evaluate** the oracle problem, legal enforcement gaps, and regulatory risks that constrain tokenized assets today [Evaluate]

Bloom's levels covered: Understand, Apply, Analyze, Evaluate

Objectives follow Bloom's taxonomy: Understand → Apply → Analyze → Evaluate.

The Scale of Illiquidity



What you see: Four bars showing the total market size of illiquid asset classes. Real estate alone exceeds $326 trillion — yet most of it cannot be traded in less than 30 days.

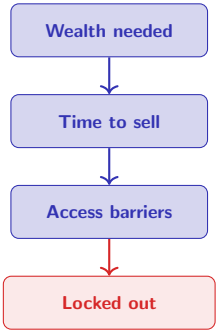
Sources: Savills Global Real Estate (2024), SIFMA Bond Markets (2024), Preqin PE (2024), Art Basel/UBS Art Market Report (2024).

Why Does This Matter?

Illiquidity creates three problems:

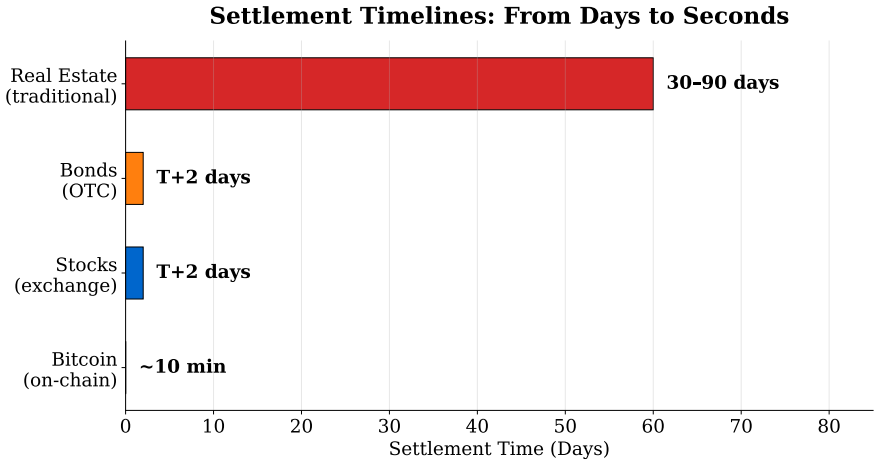
1. **High minimum investment** — a single apartment in Zurich costs CHF 800K+
2. **Slow settlement** — selling a building takes 30–90 days of paperwork, lawyers, and notaries
3. **Geographic lock-in** — you can only invest in markets where you have legal access and local knowledge

Result: The world's most stable asset class is reserved for the already-wealthy.



In traditional real estate, the minimum ticket size, legal complexity, and settlement lag exclude the vast majority of global investors.

Settlement Timelines Across Asset Classes



What you see: Horizontal bars comparing settlement speed. Stocks and bonds settle in T+2 (two business days after the trade). Real estate takes 30–90 days. Bitcoin settles on-chain in roughly 10 minutes.

T+2 became standard for US equities in 2017 (SEC Rule 15c6-1). The SEC moved to T+1 in May 2024. Tokenization targets T+0 (atomic settlement).

Meet Three People Locked Out of Real Estate

Carlos
São Paulo, Brazil

Software developer earning $2,000/month. Wants to invest in property but cannot afford the minimum $50,000 down payment for any apartment in his city.

Lin
Shanghai, China

Owns a commercial building worth $2M. Needs $200K for her daughter's education but cannot sell 10% of a building — it is all-or-nothing.

Fatima
Amman, Jordan

Refugee with $5,000 in savings. Has no local credit history, no brokerage account, and no access to institutional investment products.

All three are rational investors. None can participate in the world's largest asset class.

These personas represent three distinct barriers: capital minimums (Carlos), indivisibility (Lin), and access/identity (Fatima).

Quick Poll

Think for 30 seconds:

"What is the most valuable thing you own
that you could **not** sell by Friday?"

Car? Apartment? Art? Pension? Student loan debt?

Follow-up: How much value is trapped because you cannot sell a *fraction* of it?

Most students will realize their largest assets (education, property, car) are deeply illiquid — exactly the problem tokenization addresses.

The Promise: What If You Could?

What if you could. . .

- Buy $50 of a Zurich apartment from your phone
- Sell 10% of your building at 2 AM on a Sunday
- Receive rental income proportional to your tokens, automatically, every month
- Prove ownership without a notary, a lawyer, or a land registry visit

That is the idea behind tokenization:

Take a real-world asset, wrap it in a legal entity, and represent fractional ownership as blockchain tokens.

Key distinction:
The token does **not** replace the asset. It represents a **claim** on the legal entity that owns the asset.

Tokenization is not magic: the legal wrapper (typically an SPV) is what connects the digital token to enforceable real-world rights.

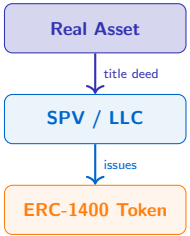
What "Tokenization" Actually Means

Tokenization = creating a digital representation of a real-world asset on a blockchain.

Three components:

1. **The asset** — a building, a bond, a painting
2. **The legal wrapper** — an SPV (Special Purpose Vehicle) or trust that holds title
3. **The token** — a smart contract entry recording who owns what fraction

Critical: You do not "own the building." You own tokens in an LLC (Limited Liability Company) that owns the building. The distinction matters for legal enforcement.



ERC-1400 is a proposed Ethereum standard for security tokens with built-in transfer restrictions, unlike the freely tradable ERC-20 standard.

Wait — Don't REITs Already Do This?

REITs (Real Estate Investment Trusts) have existed since 1960.

They already offer:

- Fractional exposure to real estate
- Liquidity (listed on stock exchanges)
- Dividend income from rental cash flows

So what is actually new about tokenization?

1. **Granularity** — tokens for a *specific* property, not a portfolio
2. **Programmability** — automated rent distribution via smart contracts
3. **Access** — no brokerage account needed; a crypto wallet suffices
4. **Settlement** — T+0 instead of T+2

Feature	REIT	Token
Minimum	\$50	\$50
Settlement	T+2	T+0
Asset choice	Pool	Single
24/7 trading	No	Yes
KYC required	Broker	Wallet
Since	1960	2018

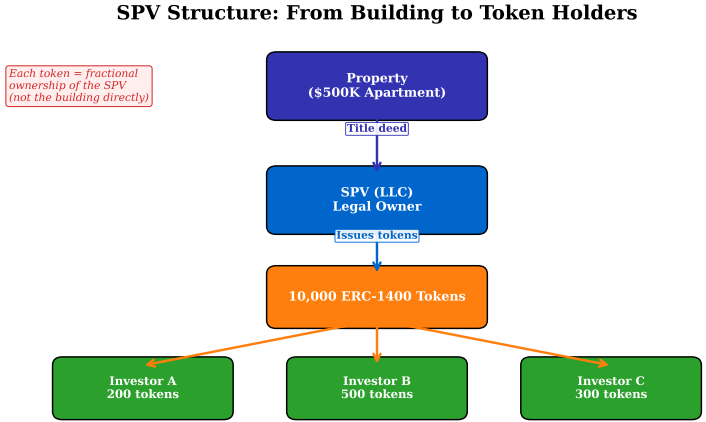
REITs (Real Estate Investment Trusts) manage \$4.5 trillion globally (EPRA, 2024). Tokenization does not replace REITs — it expands access to individual-property exposure.

Token Lifecycle: From Asset to Redemption

What you see: Five connected steps from asset origination to token redemption. Each step maps to a specific on-chain or off-chain process.

The lifecycle mirrors traditional securitization (originate-distribute) but replaces intermediaries with smart contracts at the issue, trade, and settle stages.

The SPV Structure



What you see: A property flows into an SPV (Special Purpose Vehicle) that issues 10,000 tokens. Three investors hold different quantities. Each token represents fractional ownership of the SPV, not the building directly.

The SPV (Special Purpose Vehicle) is the legal entity that isolates the asset from the issuer's balance sheet — bankruptcy-remote by design.

Step 1: Origination — Choosing and Wrapping the Asset

What happens:

1. **Asset selection** — must be revenue-generating and independently valued
2. **Legal structuring** — create an SPV (LLC, AG, or Trust) to hold title
3. **Due diligence** — third-party appraisal, environmental review, title search
4. **Regulatory filing** — register as a security or use an exemption (Regulation D in the US, prospectus in Switzerland)

Key question:

Who decides the asset is worth what the issuer claims?

Traditional answer: appraisers, auditors, rating agencies.

Tokenization answer: **still the same people**. The blockchain does not verify real-world value — only on-chain state.

Origination is the most "traditional" step. Tokenization accelerates the downstream process but does not eliminate the need for real-world due diligence.

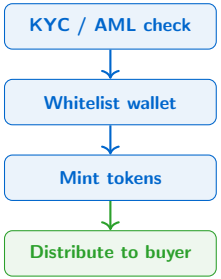
Step 2: Issuance — Minting Tokens on Ethereum

Why ERC-1400, not ERC-20?

Security tokens need compliance features that ERC-20 (the standard fungible token) lacks:

- **Transfer restrictions** — only whitelisted (KYC-verified) wallets can receive tokens
- **Forced transfers** — regulator or court can move tokens (e.g., bankruptcy proceedings)
- **Document attachments** — link to prospectus, financial statements
- **Partitioning** — separate tranches (e.g., Class A vs. Class B shares)

Simplified issuance flow:



ERC-1400 is a proposed standard (EIP-1400) that bundles ERC-1594 (core security token), ERC-1643 (document management), and ERC-1644 (controller operations).

Step 3: Trading — Where Do You Buy Tokenized Real Estate?

Three trading venues:

1. **Primary issuance platforms**
   RealT, Lofty, Landshare — buy directly from the issuer during a token sale
2. **Regulated security token exchanges**
   SDX (SIX Digital Exchange, Switzerland), tZERO (US) — order-book trading with KYC (as covered in the Tokenization Revolution lecture)
3. **Peer-to-peer (P2P)**
   Direct wallet-to-wallet transfer with compliance checks enforced by the smart contract

Liquidity reality check:

Most tokenized RE platforms have **thin order books**. You can buy easily but selling quickly at fair value is not guaranteed.

Daily trading volume on RealT:
$50K–200K (vs. $500M+ for a single listed REIT)

Liquidity fragmentation is the biggest practical challenge: tokens trade on different platforms with different KYC pools, splitting the buyer base.

Case Study: RealT — Tokenized Houses in Detroit

RealT (founded 2019, Miami):

- 400+ single-family homes tokenized
- Each property = separate LLC (SPV)
- Minimum investment: $50 per token
- Advertised yield: 8–10% gross rental income
- Blockchain: Ethereum + Gnosis Chain
- Rent distributed weekly in USDC (a stablecoin)

How it works:

1. RealT buys a house ($60K–150K, typically Detroit)
2. Creates an LLC for each property
3. Issues tokens at $50 each
4. Property manager collects rent, sends to smart contract
5. Contract distributes USDC to token holders weekly

Sample property card:

Property	15634 Liberal St
City	Detroit, MI
Price	$68,500
Tokens	1,370
Token price	$50.00
Monthly rent	$750
Gross yield	13.1%
Net yield	9.2%
Tenancy	Occupied

Note: Detroit properties carry high vacancy and maintenance risk.

RealT is the largest tokenized RE platform by property count. Competitors include Lofty (US), Landshare (BNB Chain), and Brickken (EU).

Worked Example: Token-Level Economics

Property: 500K apartment in Zurich, tokenized into 10,000 tokens at $50 each.

Line Item	**Calculation**	**Amount**
Annual gross rent	12 months $\times$ \$3,000/month	\$36,000
Property management (10%)	0.10 $\times$ \$36,000	−\$3,600
Maintenance reserve (5%)	0.05 $\times$ \$36,000	−\$1,800
Insurance + taxes	estimate	−\$4,600
Net operating income (NOI)		**\$26,000**
Per token (10,000 tokens)	\$26,000 $\div$ 10,000	**\$2.60 / token / year**
Net yield	\$2.60 $\div$ \$50.00	**5.2%**

Key insight: Gross yield (7.2%) drops to net yield (5.2%) once real costs are deducted. Always ask: *gross or net?*

Gross yield = total rent / property value. Net yield = NOI (Net Operating Income) / property value. The 200 basis point gap is where costs hide.

Worked Example: What Does Carlos Actually Earn?

Carlos invests $500 (buys 10 tokens at $50 each).

Annual income:

- 10 tokens $\times$ \$2.60/token = **\$26.00/year**
- Paid weekly: \$0.50 per week in USDC

After 5 years (no appreciation):

- Total rent received: \$130
- Total return: 26% cumulative
- Annualized: 5.2%

With 3% annual property appreciation:

- Rent: \$130
- Capital gain: \$500 $\times$ $(1.03^5 - 1)$ = \$79.27
- Total: \$209.27 on \$500 = 41.9%

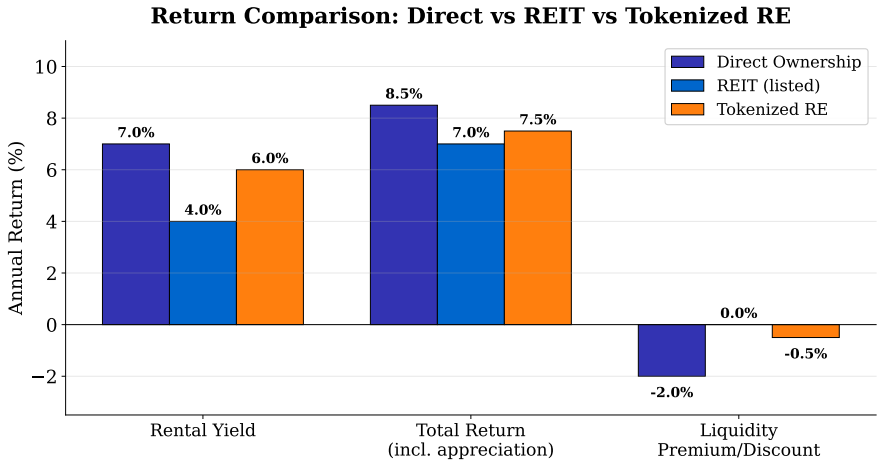
But also consider:

- Platform fee: 2–3% on purchase
- Token spread: bid-ask can be 3–5%
- Vacancy risk: 0 rent if tenant leaves
- Smart contract risk: bugs or exploits
- Regulatory risk: token classification changes
- Currency risk: if asset is in USD but you spend CHF

Net realistic return after all frictions: 3–5% annualized.

The worked example shows that tokenized RE yields are competitive with REITs (3–5%) after frictions but not the 8–10% that marketing materials suggest.

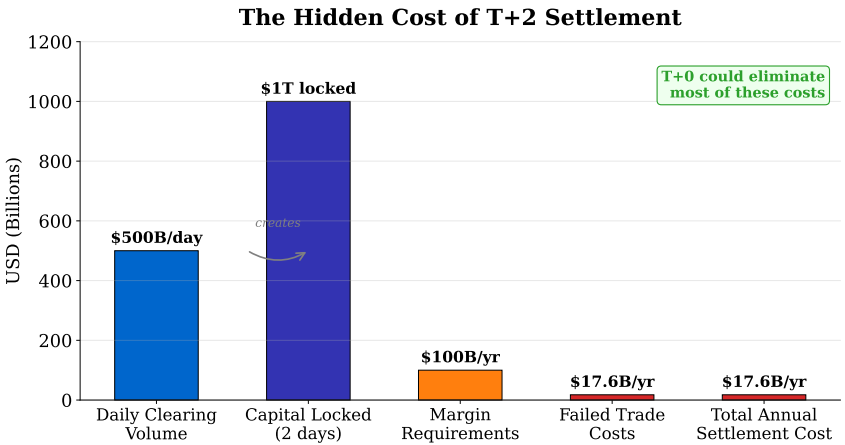
Return Comparison: Direct vs REIT vs Tokenized



What you see: Grouped bars comparing rental yield, total return, and liquidity premium/discount across three ownership models. Direct ownership has the highest yield but the worst liquidity.

Liquidity discount: direct RE trades at a discount because selling takes months. REITs trade at market price. Tokenized RE falls between the two.

The Hidden Cost of T+2 Settlement



What you see: A waterfall showing how $500B daily clearing creates $1T in locked collateral and $17.6B in annual costs. T+0 could eliminate most of this.

DTCC processes $2.15 quadrillion/year. Even small T+0 efficiency gains save billions (BCG, 2022).

Worked Example: T+0 Settlement Savings

How much capital does T+2 lock up?

Traditional (T+2):

- Daily volume: $500B
- Settlement lag: 2 days
- Capital locked: $2 \times \$500B = \mathbf{\$1T}$
- Cost of capital at 5%: $\$1T \times 0.05 \div 365 \times 2 =$ **$274M per cycle**
- Annual: $\$274M \times 252$ trading days $\div 2 =$ **$34.5B**

Tokenized (T+0):

- Daily volume: $500B
- Settlement lag: 0 days (atomic)
- Capital locked: **$0**
- Cost of capital: **$0**

Theoretical savings: $34.5B/year in capital costs alone — before counting failed trade penalties and operational overhead.

This is a simplified calculation. Real savings depend on netting efficiency, counterparty risk management, and whether atomic settlement introduces new risks (e.g., no time to detect errors).

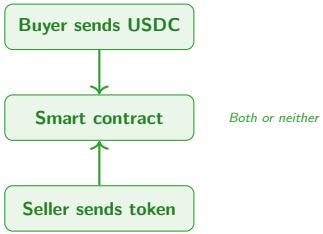
Step 4: Atomic Settlement — Delivery vs Payment

Atomic settlement = the token and the payment move simultaneously in one transaction. If either side fails, neither executes.

Traditional settlement has three risks:

1. **Counterparty risk** — buyer pays but seller does not deliver (or vice versa)
2. **Herstatt risk** — time-zone gap causes one leg to settle before the other
3. **Operational risk** — manual reconciliation errors

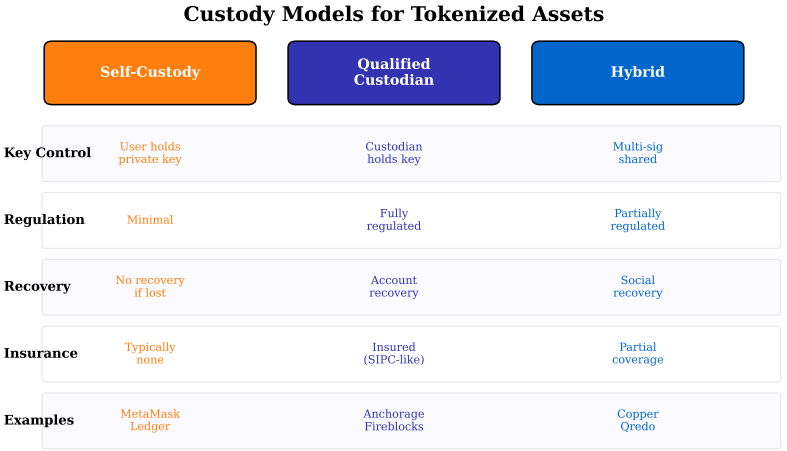
Atomic swap eliminates all three: both legs execute in one blockchain transaction or neither does.



Trade-off: no time to catch errors or fraud between trade and settlement.

Herstatt risk is named after Bankhaus Herstatt, which failed in 1974 during FX settlement, leaving counterparties exposed. Atomic swaps eliminate this by design.

Custody: Who Holds the Keys?



What you see: Three custody models compared on key control, regulation, recovery, and insurance. Institutional investors require qualified custodians; retail often uses self-custody.

Institutional adoption of tokenized assets depends heavily on qualified custody solutions meeting regulatory standards.

Step 5: Redemption — Getting Your Money Back

Redemption = burning tokens in exchange for the underlying asset or its cash equivalent.

Three redemption models:

1. **On-demand** — platform buys back tokens at NAV (Net Asset Value) minus a fee (e.g., RealT charges 2%)
2. **Scheduled** — redemption windows (quarterly, annually) similar to private funds
3. **Market sale** — sell on secondary market; no platform involvement

The hard question: What if every token holder wants to redeem at once? The underlying asset (a building) cannot be liquidated overnight.

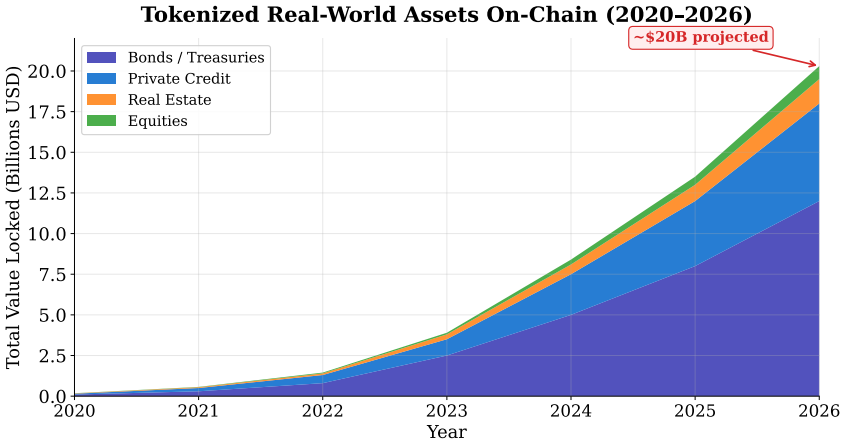
Redemption vs. secondary sale:

	Redeem	**Sell**
Price	NAV	Market
Speed	Days	Minutes
Fee	2–3%	Spread
Requires	Platform	Buyer

Most token holders will sell on secondary markets rather than redeem through the platform.

NAV (Net Asset Value) = total asset value minus liabilities, divided by number of tokens. Redemption at NAV works only if the platform has enough cash reserves.

Real-World Assets On-Chain: 2020–2026



What you see: Stacked area showing tokenized RWA growth by category. Bonds dominate; real estate is small but growing. Total on-chain RWA approaches $20B by 2026.

Sources: RWA.xyz, DefiLlama. "On-chain" = token on a public blockchain, excluding private/permissioned ledgers.

Activity (5 minutes)

Scenario: You are launching a tokenized real estate platform in Switzerland. You want to tokenize a CHF 2M apartment building in Basel.

Discuss with your neighbor:

1. What are your **first 3 regulatory steps** before you can sell tokens?
2. Which **legal entity** do you use as the SPV? (LLC, AG, foundation, trust?)
3. How do you handle **KYC/AML** (Know Your Customer / Anti-Money Laundering) for international buyers?

Hint: Look up the Swiss DLT Act (Distributed Ledger Technology Act, 2021) — it created a new category of "DLT securities" that can be transferred without a central registry (as covered in the Tokenization Revolution lecture).

Switzerland's DLT Act (2021) introduced "ledger-based securities" (Registerwertrechte) — one of the first legal frameworks globally for native on-chain securities.

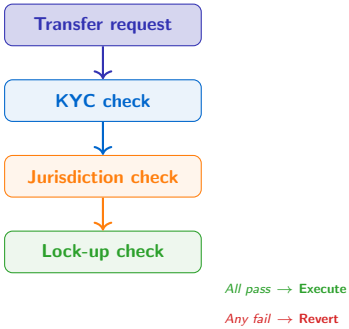
Compliance by Code: How ERC-1400 Enforces Rules

Traditional compliance: lawyers review each transfer manually.

Smart contract compliance: rules are coded into the token itself.

What ERC-1400 can enforce:

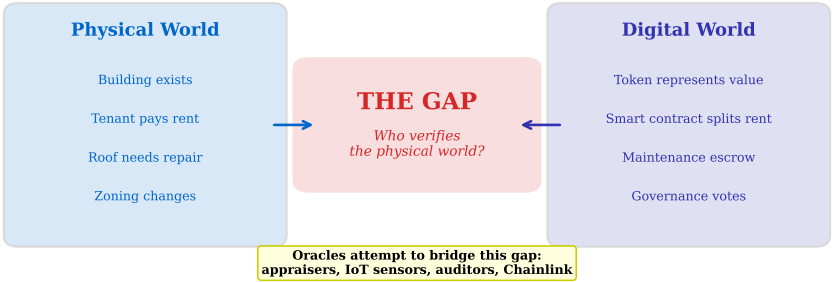
- **Whitelist check** — only KYC-verified wallets can hold tokens
- **Holding period** — tokens locked for 12 months (Regulation D)
- **Investor cap** — maximum number of holders per jurisdiction
- **Transfer limits** — daily/monthly volume caps
- **Forced redemption** — regulator can claw back tokens



Compliance-by-code shifts enforcement from post-trade checks to pre-trade validation. The trade either satisfies all rules or it does not execute at all.

The Oracle Problem: Who Verifies the Building?

The Oracle Gap: Who Verifies the Real World?



What you see: A gap between the physical world (the building exists, tenants pay rent) and the digital world (tokens represent value). Oracles attempt to bridge this gap, but they reintroduce trusted third parties.

The oracle problem is the fundamental tension of RWA tokenization: blockchains are trustless for on-chain data, but real-world assets require off-chain verification by trusted parties.

The Oracle Problem: Specific Failure Modes

What the blockchain knows:

- Who owns which tokens
- When tokens were transferred
- How much USDC was paid

What the blockchain does NOT know:

- Whether the building still exists
- Whether the tenant paid rent this month
- Whether the roof is leaking
- Whether zoning laws changed
- Whether the property manager is honest

Three oracle failure scenarios:

1. **Stale data** — appraisal says $500K but market crashed to $350K three months ago
2. **Manipulation** — property manager reports 95% occupancy when actual is 60%
3. **Missing data** — environmental contamination discovered; no one updates the token metadata

Bottom line:
Tokenization does not remove trust. It moves trust from the intermediary to the oracle.

Every RWA token is only as trustworthy as its oracle. "Trustless real estate" is a contradiction — the question is which trusted parties you are relying on.

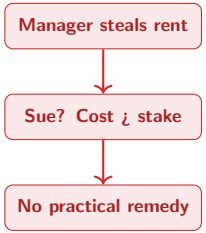
The Legal Enforcement Gap

Scenario: You own 200 tokens of a Detroit house. The property manager stops paying rent to token holders and keeps the money.

What can you do?

1. **Sue in US court** — you are in Switzerland, the LLC is in Wyoming, the property is in Michigan. Which court has jurisdiction?
2. **Cost vs. stake** — your 200 tokens are worth $10,000. Legal fees to sue in the US: $20,000+
3. **Enforcement** — even if you win, can you force a property manager in Detroit to pay?

The painful truth: for small token holders, legal recourse is economically irrational.



Class-action lawsuits could help but require coordinating 10,000 pseudonymous token holders across jurisdictions.

Legal enforcement is inversely proportional to the number of token holders. 10 investors can coordinate a lawsuit; 10,000 pseudonymous wallets cannot.

Liquidity Fragmentation: The Chicken-and-Egg Problem

The promise: tokenization makes real estate liquid.
The reality: most tokenized RE has *less* liquidity than a listed REIT.

Why?

1. **Fragmented venues** — tokens trade on RealT, Uniswap, tZERO, and P2P. No single deep order book
2. **KYC silos** — a buyer verified on Platform A cannot buy on Platform B without re-verifying
3. **Small float** — a $100K property with 2,000 tokens has very few active traders
4. **No market makers** — traditional market makers do not cover tokenized RE

Venue	Daily Vol.
NYSE (1 REIT)	$500M+
RealT (all)	$50–200K
tZERO (all)	$10–50K
Uniswap pools	$5–20K

Volume gap:

1,000–10,000× less liquid than a single listed REIT.

Liquidity attracts liquidity: until tokenized RE reaches critical mass on a single venue, it will remain less liquid than traditional alternatives.

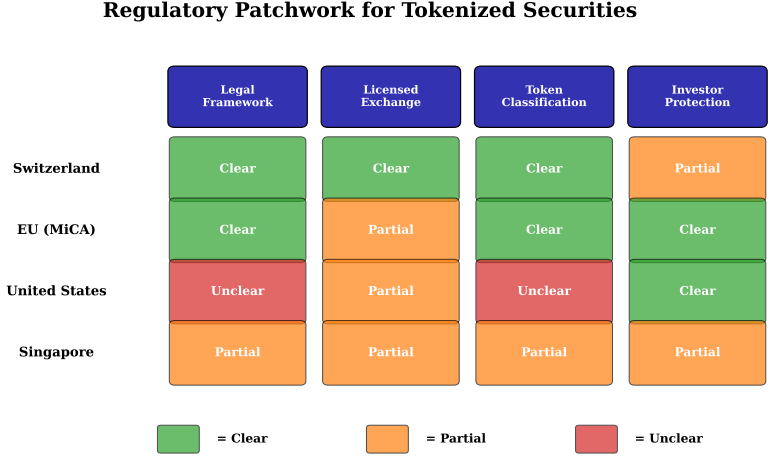
Honest Comparison: What Is Tokenization Actually Adding?

Feature	Direct RE	REIT	Tokenized RE
Minimum investment	\$50K–500K	\$50	\$50
Settlement time	30–90 days	T+1 (May 2024)	T+0
Specific property choice	Yes	No	Yes
24/7 trading	No	No	Yes
Automated rent distribution	No	Quarterly	Weekly
KYC required	Yes	Broker	Wallet
Regulatory protection	Strong	Strong	Weak
Liquidity depth	Very low	High	Very low
Track record	200+ years	64 years	6 years

The honest answer: tokenization adds specific-property exposure, 24/7 trading, and programmable distributions. But it sacrifices regulatory protection and liquidity depth. **The trade-off is real.**

Tokenized RE's true advantage is not "making RE liquid" (REITs do that). It is enabling single-asset exposure with smart contract automation for global investors.

Regulatory Patchwork: Four Jurisdictions, Four Approaches



What you see: Four jurisdictions compared on legal framework, exchange licensing, classification, and protection. Green = clear, orange = partial, red = unclear.

Switzerland's DLT Act and EU's MiCA (2023) are clearest. The US SEC applies the Howey test case-by-case with no dedicated token framework.

Spotlight: Switzerland's DLT Act (2021)

What the Swiss DLT Act introduced:

- "Ledger-based securities" (Registerwertrechte) — rights recorded on a distributed ledger instead of a central register
- **No central registrar needed** — the blockchain *is* the register
- New FINMA (Swiss Financial Market Supervisory Authority) license: "DLT trading facility" for regulated token exchanges
- Legal certainty for tokenized shares, bonds, and fund units

Why it matters: Switzerland was the first country to give blockchain-based securities the same legal status as paper-based ones.

(More detail in the Tokenization Revolution lecture.)

SDX (SIX Digital Exchange):

Operator	SIX Group
License	FINMA DLT
Blockchain	Corda (private)
Assets	Bonds, equities
First trade	Nov 2021
Settlement	T+0 (DvP)

SDX was the first fully regulated digital exchange to issue and settle tokenized bonds under national law (as covered in the Tokenization Revolution lecture).

The Swiss DLT Act amended 10 existing federal laws to accommodate distributed ledger technology, rather than creating a new standalone crypto law.

Worked Failure: What If the Building Burns Down?

Scenario: A tokenized apartment building in Detroit suffers a fire. The property is a total loss.

What happens to the tokens?

1. **Insurance claim** — the SPV files a claim. Coverage may be $300K on a $500K property (underinsured — common in low-cost markets)
2. **Token repricing** — token NAV drops from $50 to $30 (or less) overnight
3. **Liquidation** — SPV sells the land, distributes proceeds pro-rata to token holders
4. **Tax implications** — capital loss for token holders (varies by jurisdiction)

What goes wrong:

- Insurance payout takes 6–18 months
- Token holders cannot sell (who buys tokens for a burned building?)
- SPV dissolution costs (legal, accounting) eat into remaining value
- No FDIC/SIPC-like protection for token holders

Lesson: tokenization does not eliminate real-world asset risk. It *distributes* it across more holders — but each holder still bears their proportional loss.

Unlike bank deposits (FDIC) or brokerage accounts (SIPC), tokenized RE has no government-backed insurance. Your protection is only as good as the SPV's insurance policy.

The Institutional Pivot: Why BlackRock Is Paying Attention

The institutional case for tokenization:

- **Collateral efficiency** — tokenized bonds can serve as collateral 24/7, not just during market hours
- **Reduced settlement risk** — atomic DvP (Delivery versus Payment) eliminates counterparty exposure
- **Global distribution** — issue once, sell to investors in any jurisdiction with one KYC check
- **Composability** — tokenized assets can be used in DeFi (Decentralised Finance) protocols (e.g., as collateral for lending)

Key developments (reference only):

- BlackRock's BUIDL fund: tokenized US Treasuries on Ethereum (as covered in the Tokenization Revolution lecture)
- Franklin Templeton: BENJI token fund
- JPMorgan Onyx: repo transactions on-chain

When the world's largest asset manager ($10T AUM) tokenizes assets, the question shifts from "if" to "when and how."

Institutional tokenization focuses on bonds and treasuries (high-volume, standardized) rather than real estate (complex, jurisdiction-specific). RE tokenization remains retail-driven.

Beyond Real Estate: What Else Can Be Tokenized?

Asset Class	Example	Maturity	Challenge
Government bonds	US Treasuries (BUIDL)	Live, $2B+	Regulatory clarity
Private credit	Centrifuge, Goldfinch	Live, $600M	Default risk
Real estate	RealT, Lofty	Live, $100M	Oracle problem
Art & collectibles	Masterworks	Live, $800M	Valuation disputes
Carbon credits	Toucan Protocol	Pilot	Double-counting
IP / royalties	Royal.io (music)	Pilot	Revenue verification
Commodities	Paxos Gold (PAXG)	Live, $400M	Physical delivery
Equities	INX, Securitize	Pilot	Securities law

Pattern: assets that are standardized and high-volume (bonds) get tokenized first. Unique, complex assets (art, real estate) face bigger oracle and legal challenges.

Each asset class has its own oracle problem. Bonds are easiest (cash flows are contractual). Real estate is harder (physical condition matters). Art is hardest (value is subjective).

Risk Taxonomy for Tokenized Assets

Risk Category	Example	Tokenization Helps?
Market risk	Property value drops 20%	No
Credit risk	Tenant stops paying rent	No
Liquidity risk	Cannot sell tokens quickly	Partially
Smart contract risk	Code bug drains escrow	New risk
Oracle risk	Stale or manipulated appraisal	New risk
Regulatory risk	SEC reclassifies token	New risk
Counterparty risk	Platform goes bankrupt	Partially
Custody risk	Lost private key	New risk (self-custody)
Operational risk	Property manager fraud	No

Key insight: Tokenization eliminates some risks (settlement, counterparty) but introduces entirely new ones (smart contract, oracle, custody). The net risk profile is **different**, not necessarily lower.

The risk profile shifts from institutional (bank, broker, clearinghouse) to technical (code, oracles, wallets). Neither is inherently safer — they require different expertise.

The “Last Mile” Problem: Digital Token, Analog World

Blockchains are good at:

- Tracking who owns which tokens
- Executing transfers atomically
- Distributing payments automatically
- Enforcing compliance rules in code

Blockchains cannot:

- Fix a leaking pipe
- Evict a non-paying tenant
- File an insurance claim
- Appear in court
- Verify that the building is still standing

The uncomfortable truth:

Every tokenized real-world asset requires at least one trusted human (property manager, servicer, custodian) at the “last mile.”

The blockchain handles the financial layer. Humans handle the physical layer.

Tokenization redistributes trust. It does not eliminate it.

“Trustless real estate” is a marketing term, not a technical reality. The goal is not zero trust but verifiable, distributed trust with smart contract enforcement where possible.

Where Tokenization Makes Sense — and Where It Doesn't

Strong fit:

- **Institutional bonds** — standardized, high-volume, clear cash flows (BlackRock BUIDL)
- **Cross-border collateral** — 24/7 settlement saves billions in locked capital
- **Emerging market access** — investors without brokerage accounts can participate
- **Illiquid fund units** — PE/VC secondaries with programmatic transfer restrictions

Poor fit (today):

- **Small residential RE** — legal and oracle costs per property are too high relative to value
- **Unique art** — valuation is subjective; token does not help
- **Assets requiring active management** — the property manager is still the bottleneck
- **Markets with strong REIT infrastructure** — hard to compete with 60 years of REIT liquidity

Rule of thumb: tokenization works best where the underlying asset is standardized, cash flows are contractual, and existing infrastructure is weak.

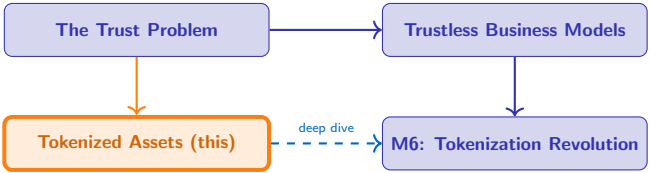
The best use cases today are institutional (bonds, collateral) not retail (houses). Retail RE tokenization is a compelling vision but the infrastructure gap remains large.

Five Key Takeaways

1. **$326 trillion in assets are illiquid.** Tokenization aims to unlock fractional access, but the underlying asset risks remain unchanged.
2. **The SPV is the bridge.** You do not own the building — you own tokens in a legal entity that owns the building. The legal wrapper is everything.
3. **Net yield, not gross yield.** Marketing says 8–10%. After management fees, vacancy, maintenance, platform fees, and spreads, realistic returns are 3–5%.
4. **The oracle problem is the hard problem.** Blockchains verify on-chain state perfectly. Real-world state (is the building there? did the tenant pay?) still requires trusted humans.
5. **Tokenization redistributes trust — it does not eliminate it.** The property manager, appraiser, and custodian are still single points of trust. The code just automates what happens *after* they report.

If you remember one thing: tokenization is a financial innovation (new distribution rails) not a real estate innovation (buildings still need roofs and tenants).

Bridge: Where This Fits in Module 3



- **The Trust Problem** — why intermediaries exist and what happens when they fail
- **Trustless Business Models** — six business models enabled by removing trust
- **Tokenized Assets (this lecture)** — deep dive into real estate tokenization
- **Module 6: Tokenization Revolution** — broader treatment across all asset classes, with BlackRock BUIDL, SDX, and Swiss DLT Act in full detail

This lecture is a focused deep dive. Module 6 covers the full tokenization landscape including institutional adoption, regulatory frameworks, and market infrastructure.

Final Discussion (5 minutes)

"Would you invest $500 in tokenized apartments in Detroit?"

Consider:

- The advertised yield is 9%. After all costs, the net yield is roughly 5%.
- Detroit property values are volatile. Appreciation is not guaranteed.
- You have no legal recourse if the property manager disappears (suing in the US costs more than your investment).
- The platform (RealT) is 6 years old. What if it shuts down?
- You could put the same $500 in a listed REIT ETF with decades of track record.

There is no right answer. The point is to think critically about the trade-offs, not to accept the marketing narrative uncritically.

Critical evaluation of yield claims, liquidity assumptions, and legal protections is the core skill this lecture aims to build.

Further Reading and Resources

Academic:

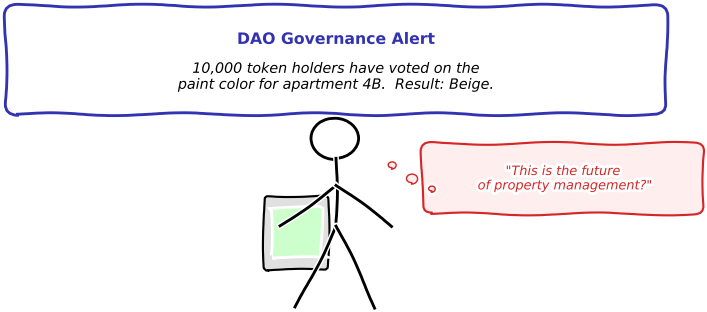
- Yermack, D. (2017). "Corporate Governance and Blockchains." *Review of Finance*, 21(1), 7–31.
- Catalini, C. & Gans, J. (2020). "Some Simple Economics of the Blockchain." *Communications of the ACM*, 63(7), 80–90.
- Gan, J. et al. (2023). "Tokenized Asset Markets." *Annual Review of Financial Economics*, 15, 73–96.

Industry:

- BCG + ADDX (2022). "Relevance of On-Chain Asset Tokenization in Crypto Winter."
- McKinsey (2024). "Tokenization: A Digital Asset Deja Vu."
- Swiss DLT Act: admin.ch/opc/en/classified-compilation/20210024
- RWA data: rwa.xyz, DefiLlama (rwa dashboard)
- RealT: realt.co (live property listings)

Start with the BCG report for industry context and the Yermack paper for the academic governance perspective. The Swiss DLT Act text is surprisingly readable.

The HOA Meeting



The HOA Meeting: governance at scale, one paint color at a time.

When 10,000 token holders govern a building, every decision becomes a DAO proposal. Democracy is great until you need to agree on a paint color.