# Block building after the Merge

mev, moving forward

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# “Currency” for crypto was always a double-edged sword

*Secure* blockspace will be
a premier commodity of this century


And so, expect battles for
*control* over blockspace

# Blockspace?

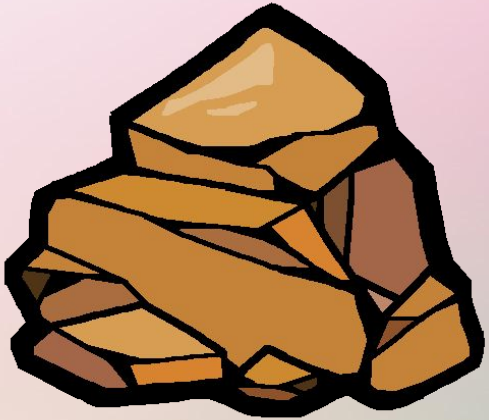
- What goes into the blockchain
- Today, transactions, tomorrow ...?
- Interface to the protocol's resources
  - The "state"

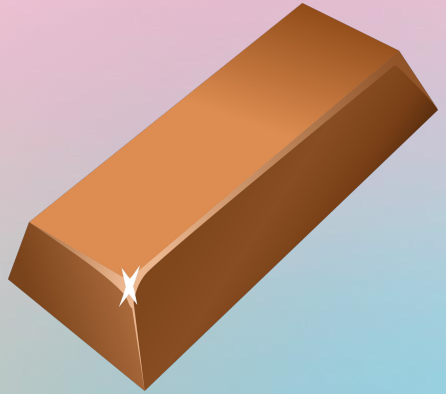
# Value supports specialization

- Blockspace is valuable to the extent that Ethereum's state is valuable

- Value creation supports specialization
  - "Builder" role

- Builders specialize in refining blockspace into higher-value goods and services





# Better blockspace?

- Sponsored transactions
  - Builder pays for gas
- Instant confirmations
  - Builder promises to include your transaction
- Cancellations, retries
  - Builder handles your transaction subject to some events (h/t @0xQuintus)
- Gas futures
  - Builder sells blockspace in the future
  - … in the past? (h/t @hasufl)
- “Account abstraction” a la EIP-4337
  - Builder offers more flexible schemes for protocol access
- MEV
  - Extraction
  - Smoothing
  - Protection, rebates

# Builder abstracts protocol from users

- Block-level EIP-1559
  - Today, each *transaction* must burn ETH
  - Economics are the same if the *block* burns an equivalent amount of ETH
- Rollups consuming blobs in EIP-4844
  - L2s consume data space at L1
  - Sequencer's job to get blobs on-chain? Manage "data gas"?

- Builder intermediates consumption of resources the protocol provides
  - Provide more value to users with flexible features
  - Enable protocol simplification
  - h/t @adietrichs


# Alex Stokes: Block-builder Innovation Post-Merge - SBC 2022

# So what's the catch?

# Builder specialization implies validator centralization

# Building has economies of scale

- Builder role today is tied to validator role in the protocol
- Better builders have greater profits
- Can scale their share of the validator set
  - Good for dominant builder in the short-run
  - But, fragilizes the network in the long-run
- Note: growth in the MEV industry accelerates timelines

# Hmm, ok so what now?

# Proposer-builder separation

- Split the builder role from the proposer (validator) role

- How? Not sure, many open research questions
  - 2 slots to alternate proposer and builder. Incentive compatible?
  - Enshrine an auction as the *only* way to allocate blockspace?
    - **@barnabemonnot on ethresear.ch: “unbundling PBS”**
  - Use attesters to avoid off-chain agreements, can they be bribed?

# Avoid builder centralization

- PBS doesn’t fix all of our problems 🥲
- A world with only a few builders makes it much easier to violate Ethereum’s values
- Even less clear how to handle this…

# Avoid builder centralization

- Have many centralized builders, foster competition so no monopolies form

- Need to keep the barrier to entry as low as possible
- But still, power laws rule everything around us...

- We are cryptoeconomists... design a mechanism?

# Decentralized building

- “Peer to peer network with proper incentive alignment to ensure safety and liveness of the protocol”

- The protocol facilitates the refinement of blockspace

- In a way that respects:
  - Value capture by the agents who generate it
  - Censorship resistance

# Sketch of decentralized building

- Single-domain
  - Agents compete in an order flow auction
  - Tradeoff b/t privacy and execution
  - CoWSwap inside an MPC?
  - Rook model: properly-incentivized searchers work in a private mempool?
- Cross-domain
  - Builders compete in an auction across networks
  - Coincident proposals means atomic cross-domain MEV!
  - Solution: another cryptoeconomic layer to coordinate trustless building?
- And again, all while supporting the outcomes where users capture most of the value they create


... seems hectic 😅

# But, we did Merge.
# Progress is possible 😇

# Validator centralization

- Support R&D for an in-protocol PBS solution
- In the meantime, we have `mev-boost`
  - An off-chain implementation of PBS started by Flashbots

- Open call for the future stewardship of `mev-boost`
  - Can contribute in many ways as we iterate towards in-protocol PBS
  - https://github.com/flashbots/mev-boost
  - https://github.com/ethereum/builder-specs
- Address censorship resistance in the `mev-boost` protocol
- Relay monitor: improve `mev-boost` security guarantees
  - https://github.com/ralexstokes/relay-monitor

# Builder centralization

- More R&D!
- Start: defining the problem
- How far can we push today's cryptography?
- How can we analyze incentives to ensure integrity?

- Flashbots has done a lot of work here
  - https://collective.flashbots.net

# Thank you!

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