Continuous Learning:
A Management Approach for the Digital Age

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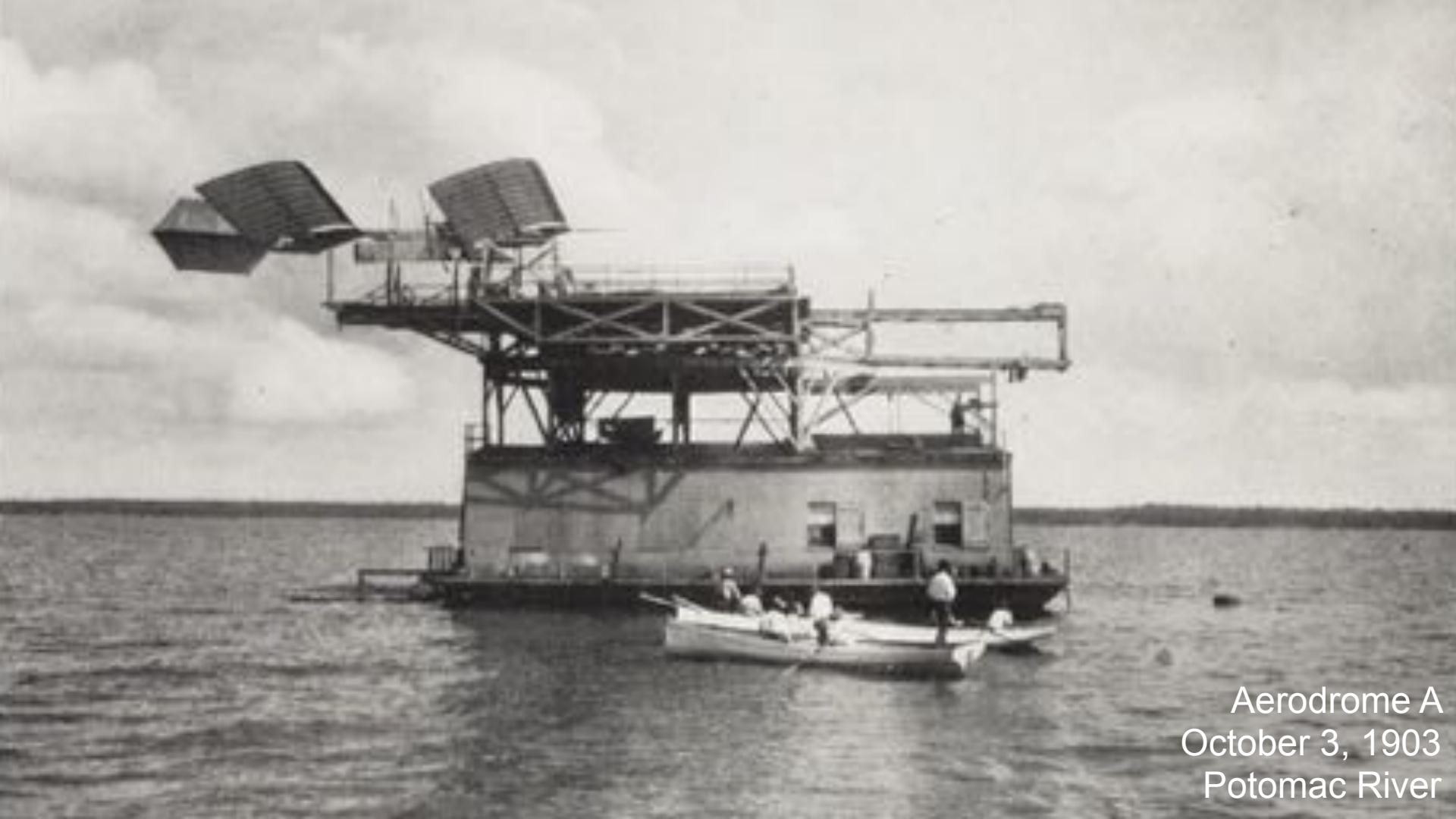
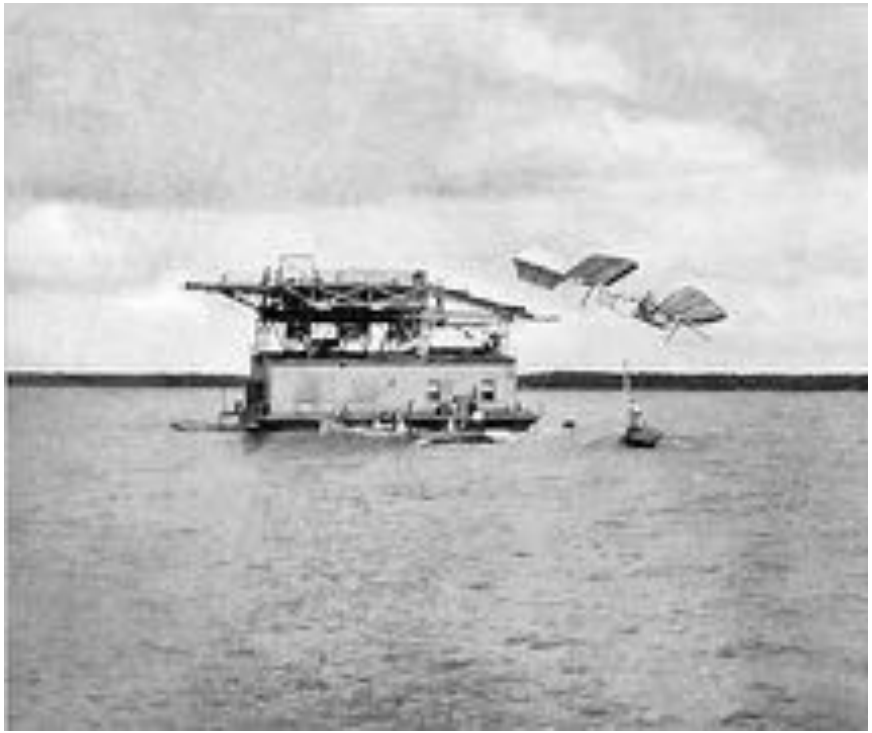


Aerodrome A
October 3, 1903
Potomac River

Samuel Langley

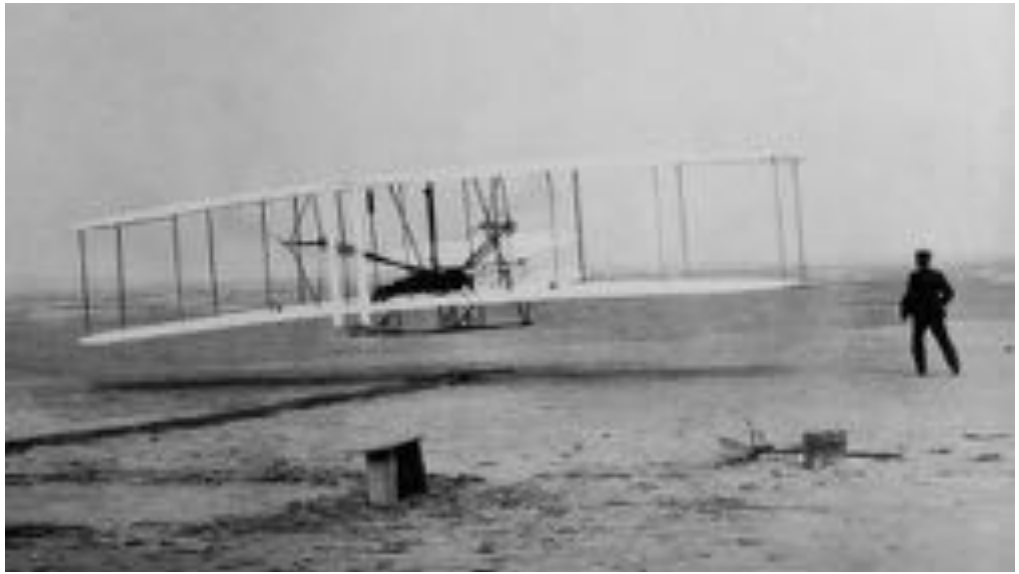
- Well-funded: $50,000
- Designed a single-point flying machine
- Never flew due to fundamental design flaws



December 17, 1903
Sand dunes of Kitty Hawk, North Carolina

Wilbur & Orville Wright

- Spent less than $1,000 US
- Iteratively learned about barriers to flight
- Created the first flying machine



Is Continuous Learning a management approach?

Technological Revolutions

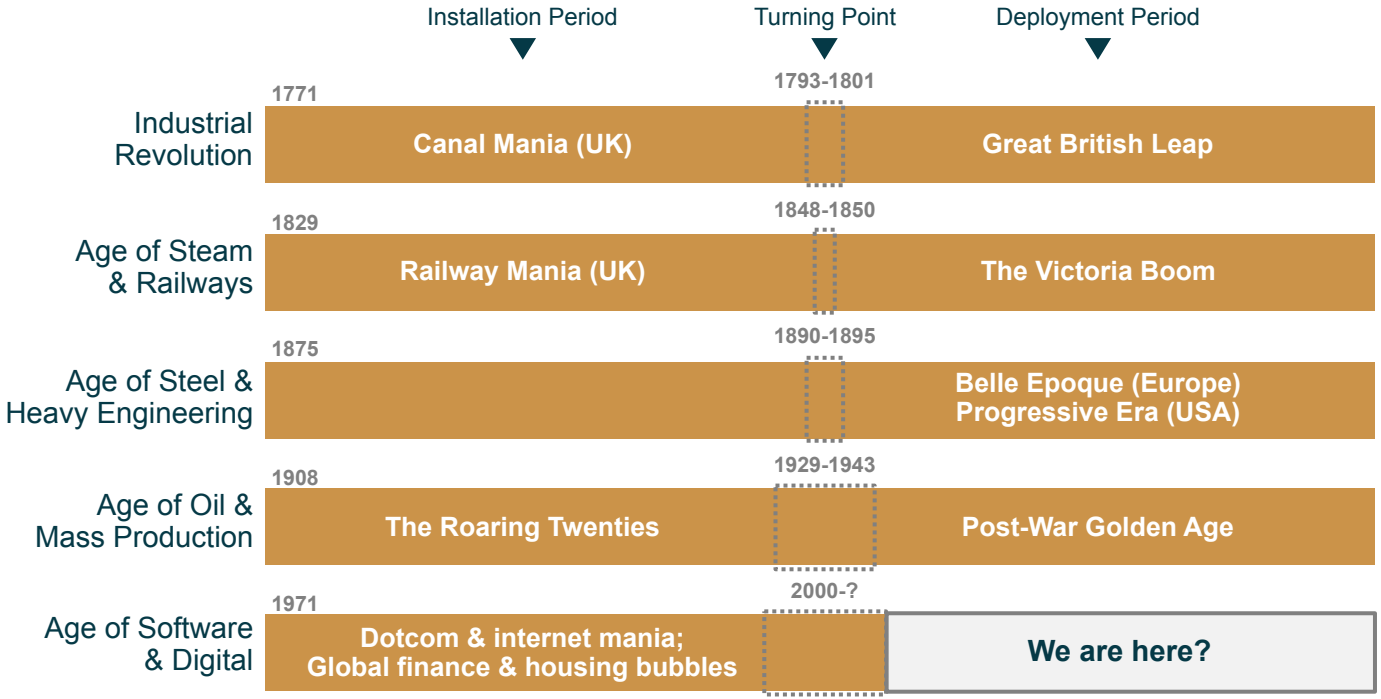


Figure: Adapted from *Technological Revolutions and Financial Capital*, Carlota Perez

Technological Revolutions & Management Approach

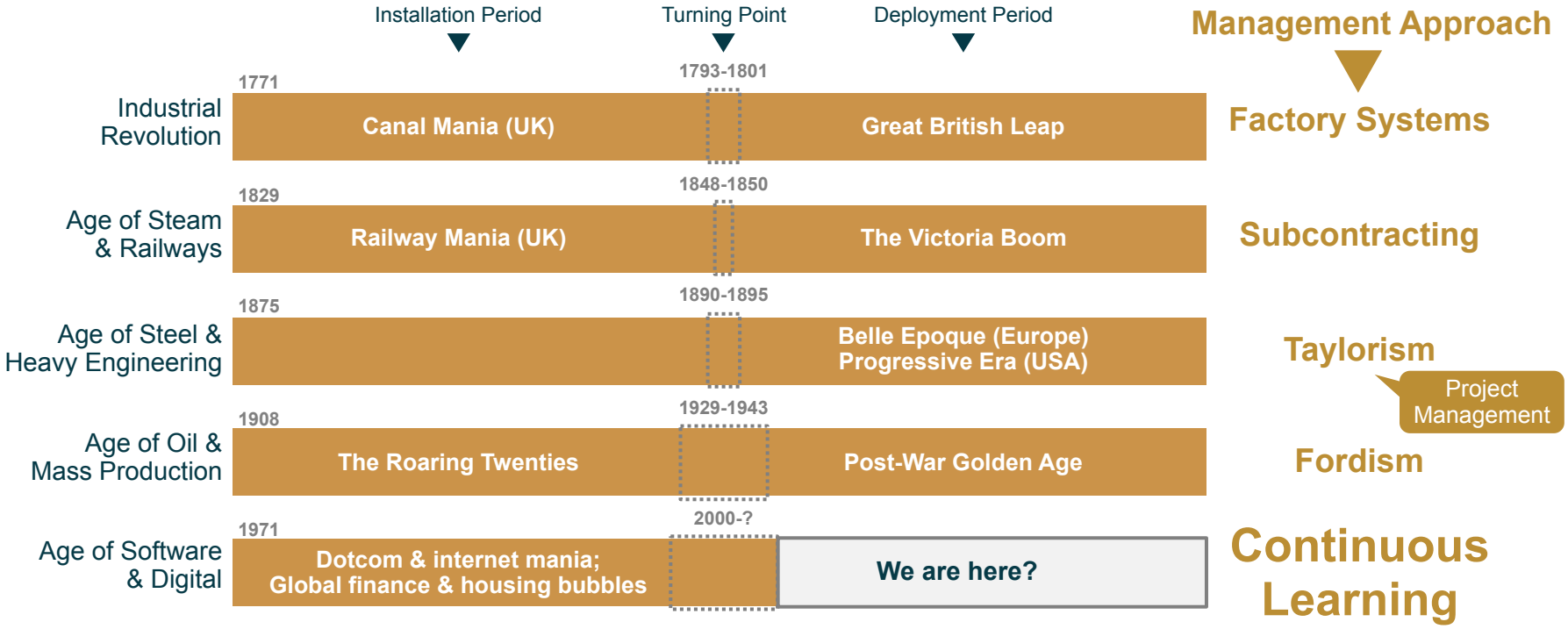


Figure: Adapted from Carlota Perez & Mik Kersten, Gene Kim

Let’s look at some emerging patterns of Continuous Learning

Pattern 1. Give intent and decentralize decision-making

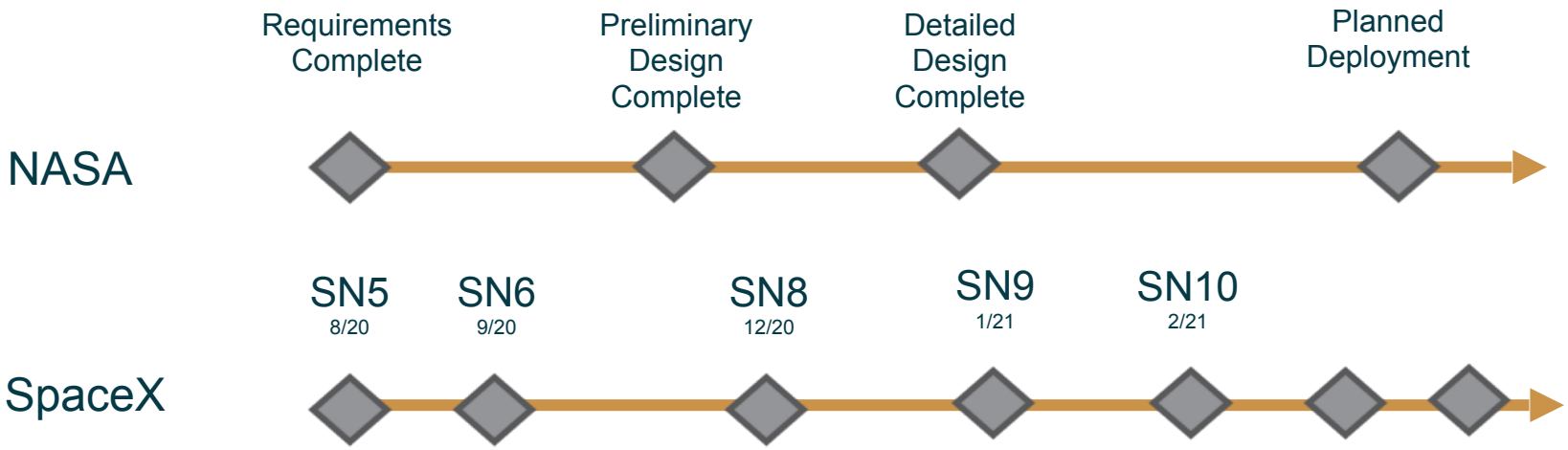
What historically took GM and other automakers five to seven years to develop and launch a new vehicle is expected to be cut to under three years for the 2022 Hummer EV.

-- Mary Barra, CEO of GM

GM completed the launch in the middle of the COVID pandemic...

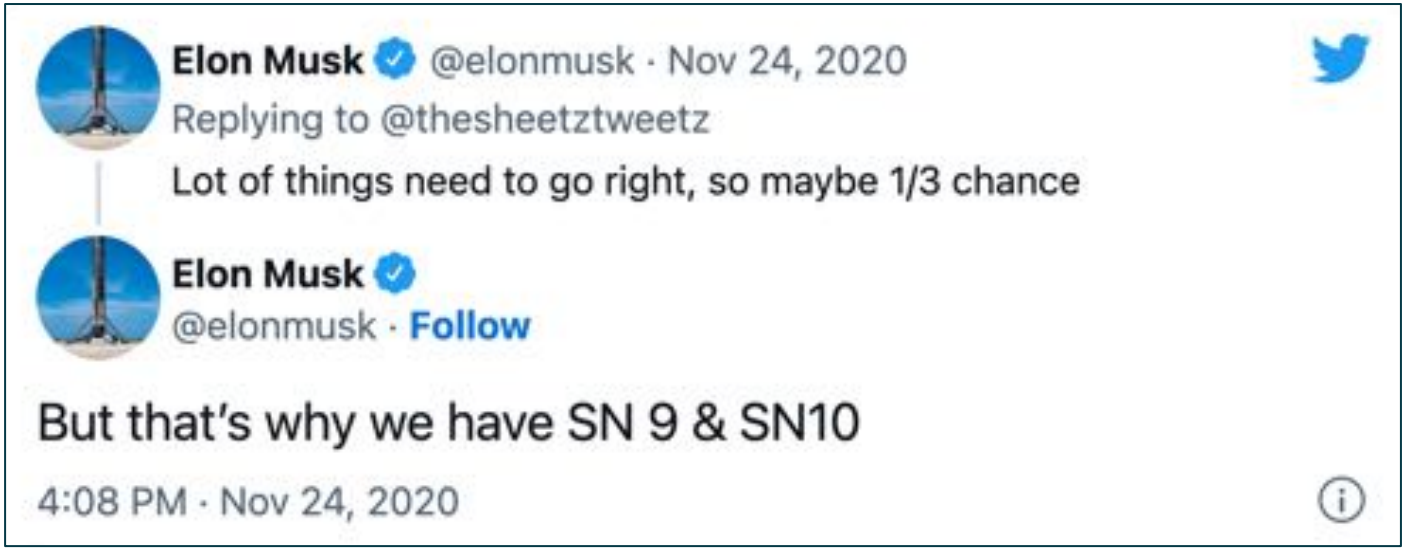
Pattern 2. Make decisions only after validating assumptions

Development is more dependent on what needs to be learned than on what tasks must be completed to exit a gate. – Allan Ward



Pattern 3. Embed telemetry into systems for learning

Tweet leading up to SpaceX Starship SN8 Test Flight



SpaceX Test Flight
Starship SN8
December 9, 2020

Elon Musk ✓
@elonmusk

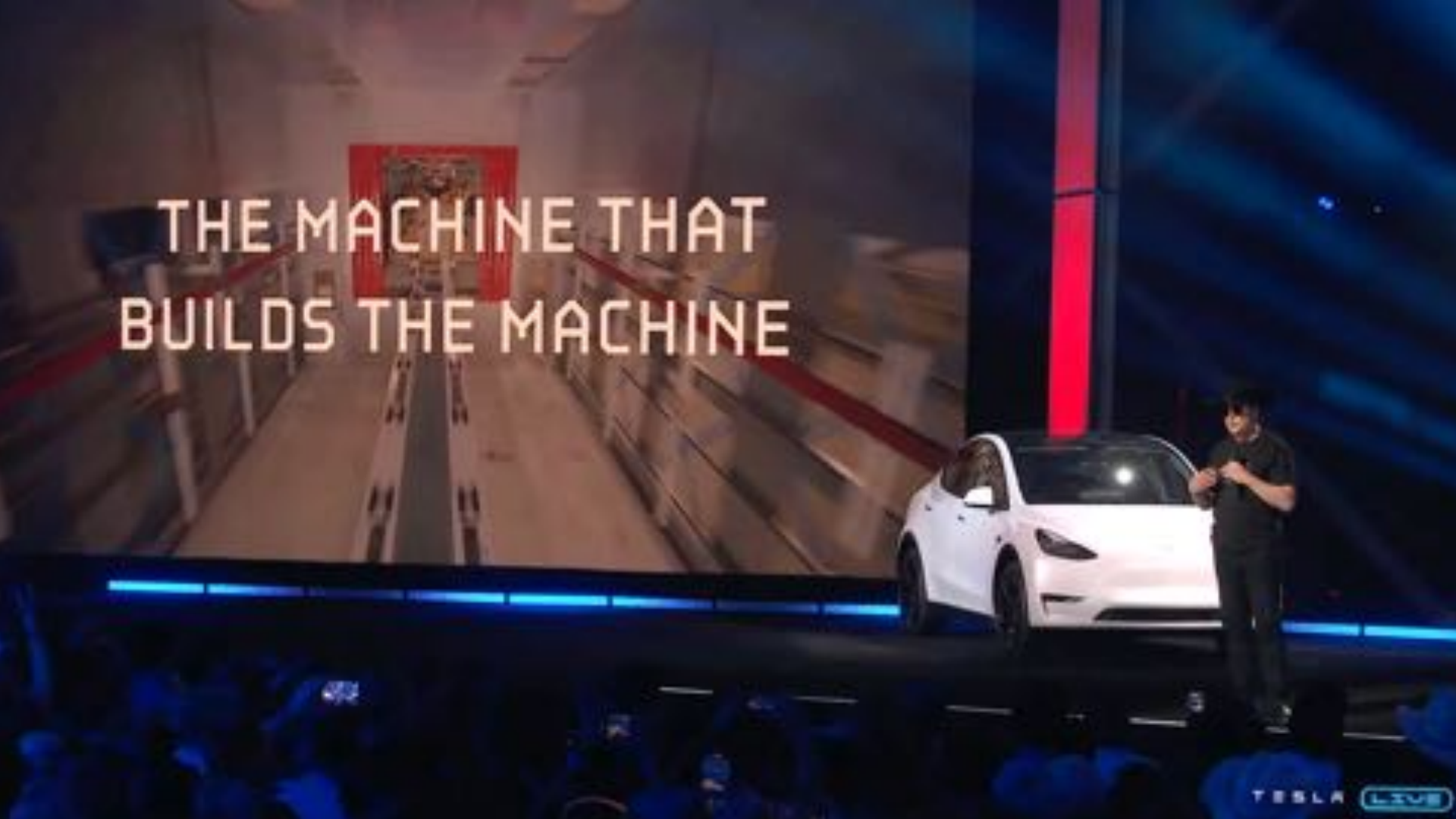
Fuel header tank pressure was low during landing burn, causing touchdown velocity to be high & RUD, but we got all the data we needed! Congrats SpaceX team hell yeah!!

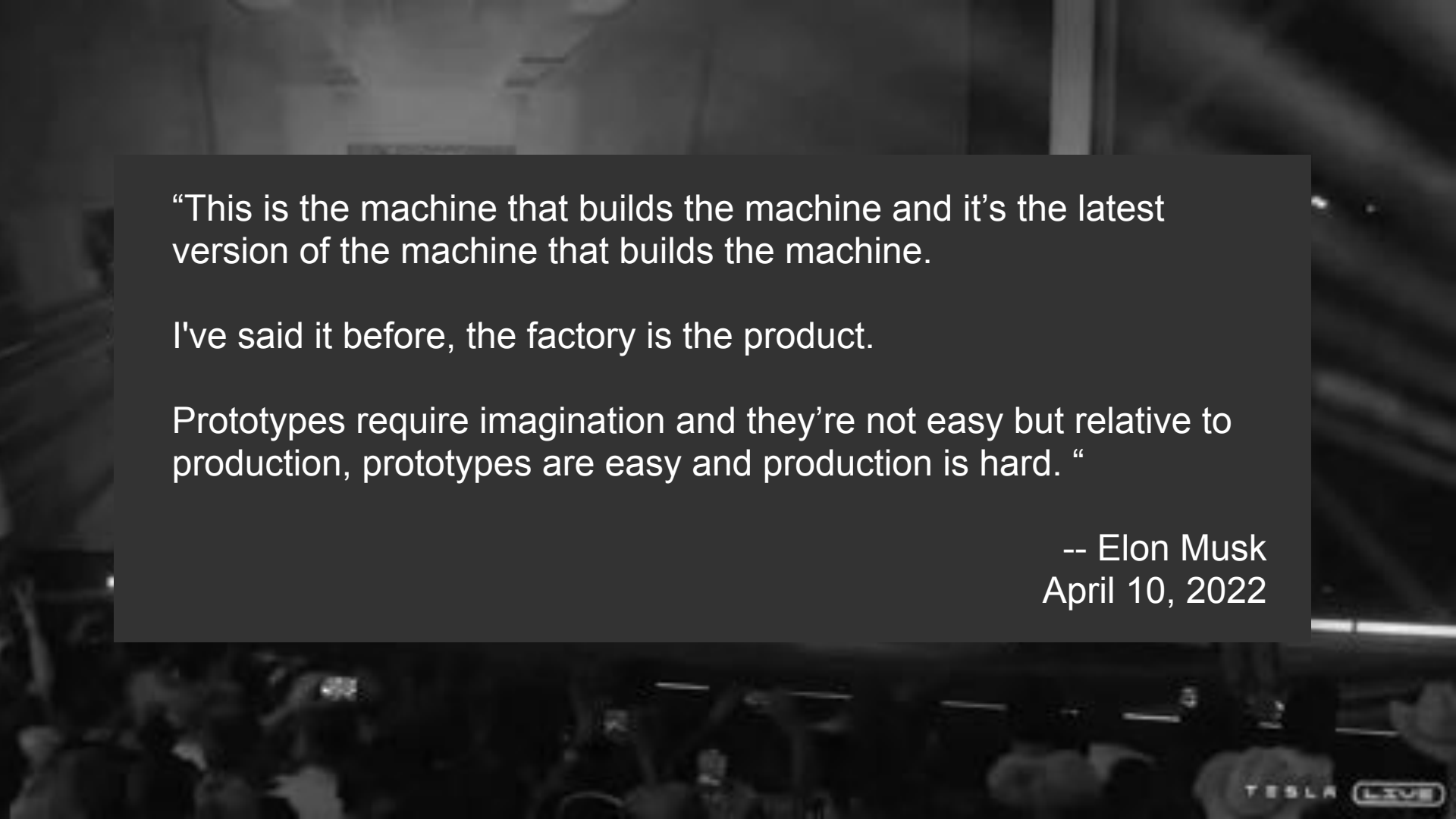
3:07 PM · Dec 9, 2020 · Twitter for iPhone

"RUD" is what SpaceX calls a
Rapid Unscheduled Disassembly

Pattern 4. The factory is the product

	Falcon 9 Block 1	Falcon 9 Block 2	Falcon 9 Block 3	Falcon 9 Block 4	Falcon 9 Block 5
Year	2010-13	2013-15	2015-17	2017-18	2018-20
Engine	Merlin 1C	Merlin 1D	Merlin 1D	Merlin 1D	Merlin 1D
Innovation	Tried Parachute recovery (failed)	60% More Thrust	17% more thrust First reusable 1st stage	Improved 2nd Stage Engine Thrust upgrades	Solve reuse & reliability
SpaceX Launches	5	15	25	11	27
Other NASA Launches	23	18	14	11	2


THE MACHINE THAT
BUILDS THE MACHINE
TESLA LIVE


“This is the machine that builds the machine and it’s the latest version of the machine that builds the machine.
I've said it before, the factory is the product.
Prototypes require imagination and they’re not easy but relative to production, prototypes are easy and production is hard. “
-- Elon Musk
April 10, 2022
TESLA LIVE

Pattern 5. Design for change

"Tesla views its production line as a laboratory for untested techniques"

-- Inside Tesla's Audacious Push to Reinvent the Way Cars Are Made
***NY Times**, June 30, 2018*

Pattern 6. Reducing the learning batch size with MVPs, small experiments

Use digital simulations and proxies to shift learning left

Emergent Patterns of Continuous Learning

1. Give intent and decentralize decision-making
2. Make decisions only after validating assumptions
3. Embed telemetry into systems for learning
4. The factory is the product
5. Design for change
6. Reducing the learning batch size with MVPs, small experiments

What do these patterns have in common

Leadership

Thank You