Exercises: Lesson 8.4 – The Future of Finance — Synthesis and Scenarios

Module 8: The Future Problem

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Exercise 1: Hype Cycle Technology Classification

Place each of the following technologies at the correct stage of the Gartner hype cycle. Justify each placement with one sentence.

Technologies to classify:

(i) Mobile payments (Apple Pay, Google Pay)
(ii) Generative AI in financial advisory
(iii) Blockchain-based supply chain finance
(iv) Central Bank Digital Currencies (CBDCs)
(v) Quantum-resistant cryptography for banking

Hype cycle stages:

(A) Innovation Trigger
(B) Peak of Inflated Expectations
(C) Trough of Disillusionment
(D) Slope of Enlightenment
(E) Plateau of Productivity

Tasks:

(a) Map each technology to a stage and justify.
(b) Identify which technology is likely to move stages fastest and why.
(c) Name one technology from the course (any module) that you believe will *never* reach the Plateau of Productivity. Explain.

Exercise 2: Scenario Planning — Quantitative Comparison

A mid-sized European bank generates €800 million in annual revenue. Estimate its financial position under two scenarios by 2032:

Metric	Scenario B: Regulated Renaissance	Scenario C: Slow Burn
Revenue growth rate	2% per year	1% per year
Cost-to-income ratio	52% (RegTech savings)	62% (legacy costs)
Compliance cost as % of revenue	8%	5%
Technology investment as % of revenue	12%	6%
Regulatory fine probability (annual)	2%	8%
Average regulatory fine	€15 million	€25 million

Tasks:

a) Calculate the bank's projected revenue in 2032 (7 years of growth) under each scenario.

b) Calculate projected annual operating costs (cost-to-income $\times$ revenue) in 2032.

c) Calculate the expected annual regulatory fine cost (probability $\times$ fine amount) under each scenario.

d) Which scenario produces higher operating profit in 2032? Show your calculation.

e) Discuss: is higher technology investment always better? What could go wrong?

Exercise 3: Design a Cross-Module Financial Product

Design a hypothetical financial product that combines technologies from **at least four** different course modules. Use the template below.

Template:

- **Product name:** (your choice)
- **Target customer:** (who uses it?)
- **Module 1 (Cost):** How does it reduce cost?
- **Module 2 (Access):** How does it expand access?
- **Module 3 (Trust):** How does it establish trust?
- **Module 5 (Automation):** What role does AI/ML play?
- **Module 6 (Infrastructure):** What technical infrastructure supports it?
- **Module 7 (Compliance):** How does it handle regulation?

Tasks:

a. Fill in the template for your product (select at least 4 modules).

b. Identify the single biggest risk to your product's success.

c. Estimate a simple unit economics model: cost per user, revenue per user, breakeven number of users.

Exercise 4: Embedded Finance Revenue Projection

An e-commerce platform with 5 million monthly active users plans to embed three financial products:

Product	Adoption Rate	Revenue/User/Month	Cost/User/Month
BNPL (buy-now-pay-later)	8%	\$2.50	\$1.80
Instant checkout insurance	3%	\$0.85	\$0.30
Cash-back savings account	12%	\$0.40	\$0.15

Tasks:

a) Calculate the monthly users, revenue, cost, and profit for each embedded product.

b) Calculate the total annual embedded finance profit for the platform.

c) If BNPL default rate is 4% of loan volume and average loan is \$120, calculate the monthly expected loss. Is the product still profitable?

d) The platform considers adding embedded investment (fractional shares). If 2% of users adopt at \$0.60 revenue and \$0.45 cost per user per month, what is the incremental annual profit?

e) Discuss which course module's concepts are most relevant to managing the BNPL default risk.

Exercise 5: Autonomous Finance — Level Assessment

Classify each of the following financial services by its autonomy level (0–5) and identify which course module explains the relevant technology:

Service	Autonomy Level	Primary Module
A teller approving a wire transfer	?	?
Robo-advisor with quarterly human review	?	?
Aave lending protocol auto-liquidation	?	?
AI chatbot answering account balance queries	?	?
ML fraud detection that blocks transactions	?	?
Algorithmic trading with human kill-switch	?	?
Hypothetical: AI CEO running a digital bank	?	?

Tasks:

a) Fill in the autonomy levels and primary modules.

b) For each Level 3+ service, identify the accountability gap: who is responsible when it fails?

c) A regulator proposes banning any financial service above Level 3. Argue *for* and *against* this proposal.

Exercise 6: Digital Finance Career Skills Self-Assessment

Rate your current proficiency (1 = beginner, 5 = expert) in each skill area, then identify gaps for your target career path.

Skill Area	Your Rating	FinTech PM	ML Engineer	Risk Analyst
Python programming	?	3	5	4
Financial regulation	?	3	2	5
Machine learning	?	2	5	4
Blockchain/smart contracts	?	2	3	2
Data analysis/statistics	?	3	4	5
Product management	?	5	2	2
Risk measurement (VaR, ES)	?	1	3	5
API design/integration	?	4	4	2

Tasks:

a) Fill in your self-assessment ratings.

b) Choose a target career path and calculate your "skill gap" (sum of required − your rating, where positive).

c) Create a 12-month learning plan: for your three largest gaps, identify one specific course, book, or project to close each gap.

d) Which skill area do you think AI will *not* be able to automate within 10 years? Why?

Exercise 7: Applying Carlota Perez to FinTech History

Perez identifies three phases: **Installation** (speculation), **Turning Point** (crash/regulation), and **Deployment** (real infrastructure).

Tasks:

a) Map the following events to Perez's phases:
   - 2017 ICO boom ($5.6 billion raised)
   - 2022 crypto crash (Terra/Luna, FTX collapse)
   - 2024 EU MiCA regulation enacted
   - 2024–2025 real-time payment networks reach 80+ countries
   - 2023–2024 GenAI investment surge ($50B+ in FinTech AI)

b) For the *deployment period*, identify three specific technologies from the course that are entering this phase and explain why.

c) Perez argues that deployment periods create the most lasting economic value. Using one example from Module 1 (Cost) or Module 6 (Infrastructure), calculate a rough estimate of value created.

d) Is it possible that FinTech skips the deployment period and goes directly into a new installation cycle (e.g., AI hype following crypto hype)? Discuss.

Exercise 8: Integrative Case — Building the Bank of 2032

Scenario: You are advising a team that has just received a banking license to build a fully digital bank from scratch. The bank will launch in 2027 and target 1 million retail customers by 2032. You have €200 million in initial capital.

Tasks — use concepts from all eight modules:

a. **Cost (M1):** Design the cost structure. What is your target cost-to-income ratio? How will you achieve it without physical branches?

b. **Access (M2):** How will you serve the underbanked? What alternative data sources will you use for credit scoring?

c. **Trust (M3):** Will you use blockchain for any operations? If yes, which ones and why?

d. **Risk (M4):** How will you measure and manage credit, market, and operational risk?

e. **Automation (M5):** What will AI handle autonomously vs. with human oversight?

f. **Infrastructure (M6):** Cloud-native or hybrid? Which APIs will you build vs. buy?

g. **Compliance (M7):** How will you embed RegTech from day one?

h. **Future (M8):** Which emerging pattern (embedded finance, autonomous finance, programmable money, AI-native) defines your strategy?

Answer Key (1/3)

Exercise 1:

(a) (i) Plateau of Productivity — widely adopted, well-understood. (ii) Peak of Inflated Expectations — massive hype, unclear ROI. (iii) Trough of Disillusionment — pilot failures, slow adoption. (iv) Slope of Enlightenment — pilot CBDCs showing results in China, Bahamas. (v) Innovation Trigger — post-quantum standards just released (NIST 2024).

(b) GenAI will move fastest — media cycle and investment pace accelerate hype-to-trough transitions.

(c) Reasonable answers: ICOs (failed), metaverse banking (no product-market fit), fully autonomous AI banks (regulatory barriers).

Exercise 2:

(a) Regulated: $800M \times 1.02^7 = €919.4M$. Slow Burn: $800M \times 1.01^7 = €857.7M$.

(b) Regulated: $919.4M \times 0.52 = €478.1M$. Slow Burn: $857.7M \times 0.62 = €531.8M$.

(c) Regulated: $0.02 \times 15M = €0.3M$. Slow Burn: $0.08 \times 25M = €2.0M$.

(d) Regulated profit: $919.4 - 478.1 - 0.3 = €441.0M$. Slow Burn profit: $857.7 - 531.8 - 2.0 = €323.9M$. Regulated Renaissance is €117M more profitable.

(e) Technology investment can fail (implementation risk, vendor lock-in, change management costs).

Answer Key (2/3)

Exercise 4:

(a) BNPL: $5M \times 0.08 = 400K$ users, Rev = $\$1.0M$, Cost = $\$720K$, Profit = $\$280K$/mo. Insurance: $5M \times 0.03 = 150K$, Rev = $\$127.5K$, Cost = $\$45K$, Profit = $\$82.5K$/mo. Savings: $5M \times 0.12 = 600K$, Rev = $\$240K$, Cost = $\$90K$, Profit = $\$150K$/mo.

(b) Total monthly profit = $\$512.5K$. Annual = $\$6.15M$.

(c) BNPL monthly loans = $400K \times \$120 = \$48M$. Default loss = $\$48M \times 0.04 = \$1.92M$/mo. Net BNPL = $\$280K - \$1.92M = -\$1.64M$/mo. **Not profitable** — BNPL unit economics collapse with 4% defaults.

(d) Investment users = $5M \times 0.02 = 100K$. Profit = $100K \times (\$0.60 - \$0.45) = \$15K$/mo = $\$180K$/yr.

(e) Module 4 (Risk) — credit risk measurement and loss-given-default estimation.

Exercise 5:

(a) Teller wire: L0 (M1). Robo-advisor: L2 (M5). Aave liquidation: L5 (M3). Chatbot: L1 (M5). Fraud blocking: L3 (M7). Algo trading: L4 (M4). AI CEO: L5 (M8).

(b) L3 fraud: bank liable for false positives. L4 algo: firm liable but attribution unclear. L5 Aave: no legal entity to sue. L5 AI CEO: unprecedented — no legal framework.

(c) For: consumer protection, human accountability. Against: stifles DeFi innovation, pushes activity offshore.

Answer Key (3/3)

Exercise 7:

a. ICO boom: Installation. Crypto crash: Turning Point. MiCA: Turning Point (regulation). Real-time payments: Deployment. GenAI surge: Installation (new cycle overlapping).

b. Deployment technologies: (1) Real-time payments (UPI, FedNow) — proven, scaling globally. (2) Open banking APIs — mandated, in production. (3) RegTech — solving real compliance costs.

c. Example (M1): real-time payments eliminate $\sim$**\$**1.50 per cross-border transaction for 150B annual transactions = $\$225B$ value created.

d. Yes — Perez acknowledges overlapping cycles. AI hype may be a new installation period before crypto's deployment phase completes. Multiple technological revolutions can co-exist at different phases.

Exercise 8: Open-ended design exercise. Strong answers will:

- Target cost-to-income $<35\%$ (M1), use cloud-native stack (M6)
- Serve underbanked with alternative credit scoring (M2, M5)
- Use blockchain selectively (e.g., cross-border settlements, not core banking) (M3)
- Deploy ML for credit, fraud, and personalization with human oversight (M4, M5)
- Build RegTech into product architecture from day 1 (M7)
- Choose "AI-native" or "embedded finance" as strategic identity (M8)
- Show awareness that €200M must cover 5+ years of losses before profitability