Innovating with Purpose: Navigating Complex Challenges"

Fabio Guida

MULTIVERSITY amazon PIAGGIO AEROSPACE vulcanair aircraft

- Ex Chief Engineer of P1HH, P2HH and MPA Aircraft
- Ex CTO of Piaggio Aero Industries
- Ex Chief Engineer and Chief Technologist at Amazon Prime Air
- CTO at Multiversity

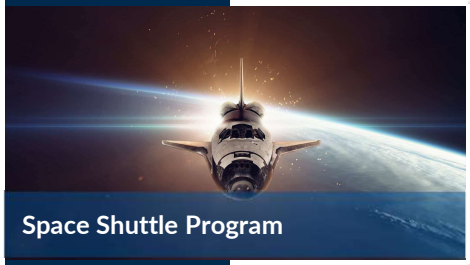
The Importance of Customer-Centricity: *Cautionary Tales in Aerospace*


Concorde Supersonic Jet

ISSUE	LESSON
▪ high operating and ticket costs ▪ Sonic boom	▪ Customer affordability ▪ Practicality alignment is as important as technological advancement


Spruce Goose (Hughes H-4 Hercules)

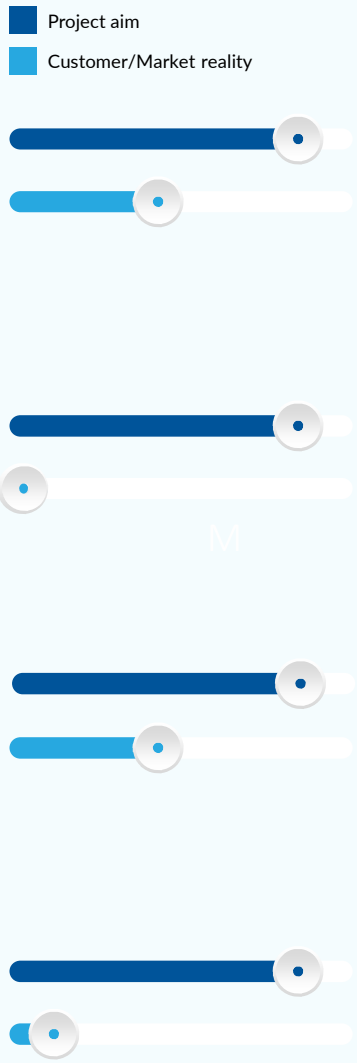
ISSUE	LESSON
▪ overspending and impracticality ▪ Too late to the game	▪ Market timing ▪ current needs


Space Shuttle Program

ISSUE	LESSON
▪ Operational issues ▪ Address high costs ▪ Safety concerns ▪ Failure to meet initial space access goals	▪ safety, reliability, and cost-efficiency for customer satisfaction


Airbus A380

ISSUE	LESSON
▪ High operating costs ▪ Limited Airport compatibility	▪ Align big projects with market demand and practicality



Revolutionizing Aerospace: Customer-Driven Innovations

AIRBUS A320'S INNOVATIVE COCKPIT DESIGN

Customer Needs

- Discussion - Airbus focused on both pilots and airlines needs
- Creating more intuitive, efficient cockpit and standardizing it across the fleet

Impact

- Educed training costs
- Operational efficiency, and enhanced safety

SPACEX'S REUSABLE ROCKET TECHNOLOGY

- high costs of space access
- reusable rocket technology
- Traditional rocket launches (~$350 million) vs. SpaceX (~$62 million), 82% cheaper
- expanded space exploration and commercial opportunities

KEY TAKEAWAYS

- Customer Needs first
- Ingenuity to create competitive advantage
- No need for a fancy aircraft

From Concept to Reality: Overcoming Scaling Hurdles in Drone Delivery

OPERATIONAL AND MANUFACTURING COSTS

CAPACITY FOR LARGE-SCALE OPERATIONS

NOISE AND SUSTAINABILITY CONCERNS

AUTOMATION OF GROUND HANDLING AND SAFETY COMPLIANCE

Challenges

- costs in drone operations
- 737 with the cost of a Hunday

- Scaling operations without increased risks or inefficiencies

- Noise pollution and environmental sustainability in public acceptance and regulatory compliance

- Speed of operations
- Adherence to stringent safety standards

Solutions

- **Design for Cost**: Strategies to design cost-efficient drones without compromising on quality
- **Design for Manufacturing**: Principles to simplify manufacturing processes
- **Autonomy:** Implementing advanced autonomous technologies to manage large fleets

- **Orchestration of Flights:** Developing systems for efficient orchestration of multiple drone flights in varying airspace conditions

- **Noise Reduction Mechanisms:** Design elements and flight operational strategies to minimize noise
- **Sustainable Practices:** Adopting eco-friendly materials and energy sources to enhance environmental sustainability

- **Ground Handling Automation:** Streamlining and automating ground operations to improve efficiency and safety
- **Safety Protocols:** Developing robust safety protocols to meet regulatory requirements and ensure reliable operations

Strategizing Innovation: Inventing vs. Integrating in Drone Delivery

THE INNOVATION DILEMMA

- Overcoming Scale Limiting Factors requires innovation.
- Invention vs Integration

CASE FOR INVENTION: LOW NOISE AND AUTONOMY CERTIFICATION

- **Low Noise Technology:** Necessity of inventing low noise solutions for drones to enhance public acceptance and meet regulatory standards
- **Certifying Autonomy:** The need to develop new methods or technologies for certifying the autonomy of drones, ensuring safety and reliability in unmanned operations

CASE FOR INTEGRATION: NATURAL FIBER COMPOSITES

- **Material Innovation:**
  The decision to integrate natural fiber composites into drone design for their eco-friendly and lightweight properties

BALANCING THE TWO APPROACHES

- **Strategic Decision-Making:** Companies can strategically decide when to invent new technologies and when to integrate existing solutions, based on factors like cost, time, regulatory requirements, and market needs
- **Adaptive Innovation:** Being adaptable and responsive to evolving technology landscapes and market dynamics in the drone delivery industry

Blueprint for Success: Strategic Planning in Drone Delivery

THE IMPORTANCE OF A SOLID PLAN

- **Purpose:** Highlight importance of comprehensive plan for navigating challenges, aligning with objectives

RISK MANAGEMENT AND CONTINGENCY PLANNING

- **Identifying Potential Risks:** Detail risk identification in operations, technology, and market dynamics
- **Contingency Strategies:** Present contingency plans to mitigate these risks, ensuring operational resilience

STAKEHOLDER ENGAGEMENT AND COMMUNICATION

- **Engaging Stakeholders:** Emphasize involving all stakeholders: regulatory bodies, partners, and the community
- **Effective Communication:** Highlight communication's role in securing stakeholder buy-in and addressing concerns proactively

KEY COMPONENTS OF THE PLAN

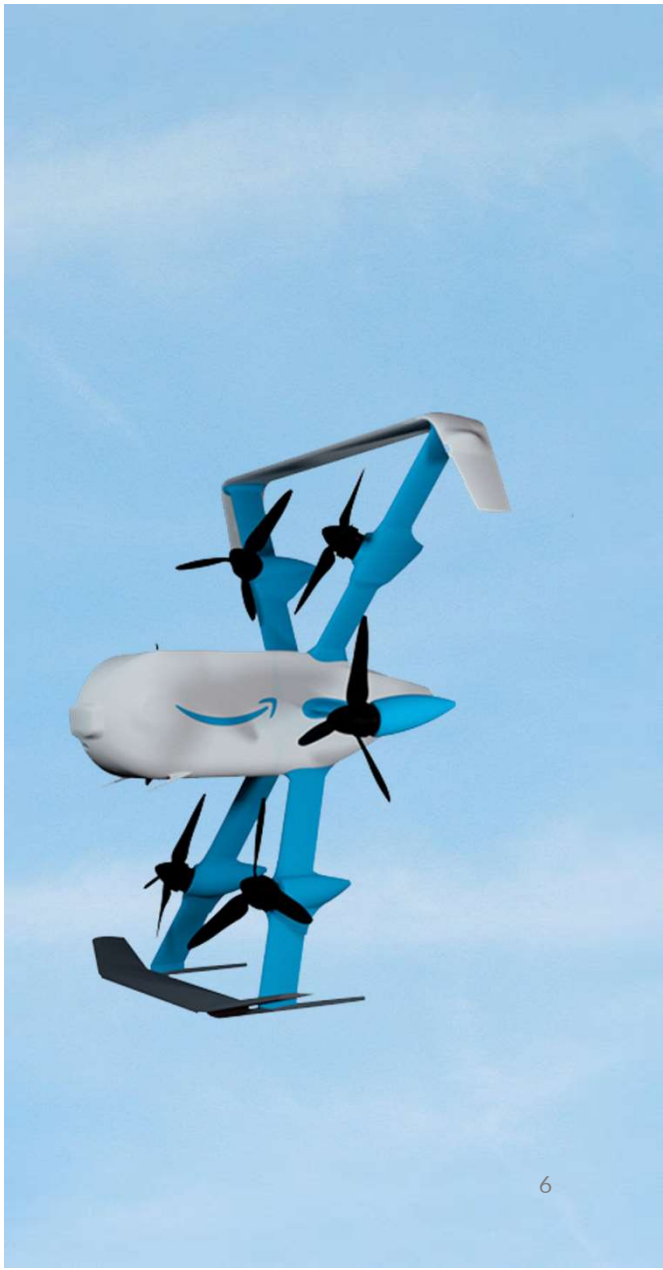
- **Market Analysis and Adaptation:** Emphasize ongoing market analysis to tailor services to evolving customer needs and conditions
- **Technology Development:** Explore plans for technology innovation, including low-noise solutions and autonomy certification
- **Regulatory Compliance:** Outline strategies for regulatory compliance, crucial for operational legitimacy and safety

MILESTONES AND PERFORMANCE METRICS

- **Setting Milestones:** Define key milestones with clear targets and timelines
- **Measuring Success:**
  - Discuss metrics
  - KPIs used to track progress and success

SOURCES FOR PLANNING

- **Industry Reports and Market Analysis:** Use reports from sources like FAA, EASA, or market research firms for industry trends and regulatory landscapes
- **Case Studies and Best Practices:**
  - Refer to successful case studies
  - Best practices in drone delivery from leading companies
- **Expert Consultations:** Engage industry experts or consultants for insights and guidance in planning



Systems Engineering: The Backbone of Drone Delivery Success

INTRODUCTION TO SYSTEMS ENGINEERING

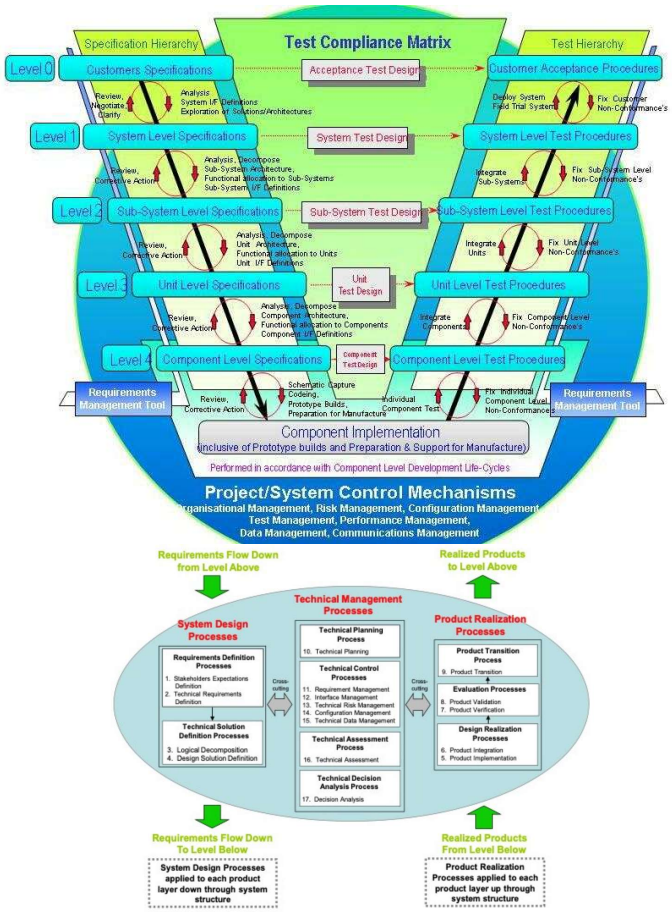
- What is Systems Engineering?
- Why it is important?

MANAGING COMPLEXITY AND INTERDEPENDENCIES

- Complexity Management
- Interdependency Handling

ADAPTING TO TECHNOLOGICAL ADVANCES AND REGULATORY COMPLIANCE

- Technological Evolution
- Regulatory Adherence



SYSTEMS ENGINEERING IN DESIGN AND DEVELOPMENT

- Design Integration
- Development Process

SYSTEMS ENGINEERING IN RISK MANAGEMENT

- Risk Identification
- Mitigation Strategies

RESOURCE FOR IN-DEPTH UNDERSTANDING

- NASA Systems Engineering Handbook
- INCOSE Systems Engineering Handbook

Shaping the Future: Key Takeaways and *Next Steps in Drone Delivery*

1. RECAP OF KEY POINTS
2. THE ROAD AHEAD FOR DRONE DELIVERY
3. DON'T WORK ON WHAT IS NOT NEEDED, THINK AT SYSTEM LEVEL
4. FURTHER LEARNING AND RESOURCES

- **Summary:**
  - Customer-centric innovation
  - Scalability solutions
  - Invention-integration balance
  - Systems Engineering role

- **Future Trends**
  - Autonomy
  - Regulatory clarity, and wider sector adoption
  - Design for Cost

- **Continuous Learning**
  - Approach Systems Engineering
  - Stay Adaptable to tech
  - Find what gives a real advantage to customers

- **Complex Systems**
- **Autonomy**
- **AI/ML**

Stay Connected

Reach out for further questions

FABIO GUIDA

fabio.guida@multiversity.it

Connect with me on LinkedIn