

Part 11

No. 1



C.O.S.T ENGINEERING™

„Design and Marketing of Rockets“

Lecture Series given by Dr.-Ing. Robert Alexander Goehlich



- Part 11: Conclusion -

Content

No. 2



- **General**
- **Conclusion**
 - Potential of Cost Engineering
 - Limits to Realize Strategies
- **Definition**
 - Cost Engineering Practice
- **Requests from Audience for Lectures**

General Contact

No. 3



Dr.-Ing. Robert Alexander GOEHLICH
Mobile: +81-(0)90 1767 1667
Fax: +81-(0)45-566-1778
Email: mail@robert-goehlich.de
Internet: www.robert-goehlich.de



Ms. Akiko FUJIMOTO (Teaching Assistant)
Mobile: +81-(0)80-5039-6222
Email: af07302002@yahoo.co.jp



Mr. Kenji HASEGAWA (Webmaster)
Mobile: n.a.
Email: malayzaru@hotmail.com



Keio University
Department of System Design
Engineering
Ohkami Laboratory
(Space System Engineering)
Office 14-609/14-620
3-14-1 Hiyoshi
Kohoku-ku
Yokohama 223-8522
JAPAN

General Goal of Today's Lecture

No. 4

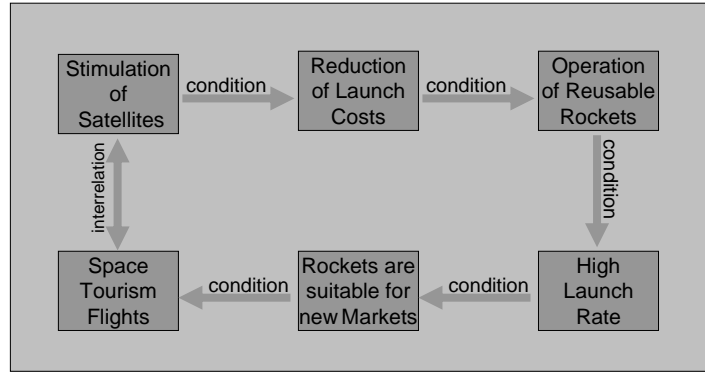


„You will learn about the potential as well as the limits of Cost Engineering.“

Chicken-Egg-Circle

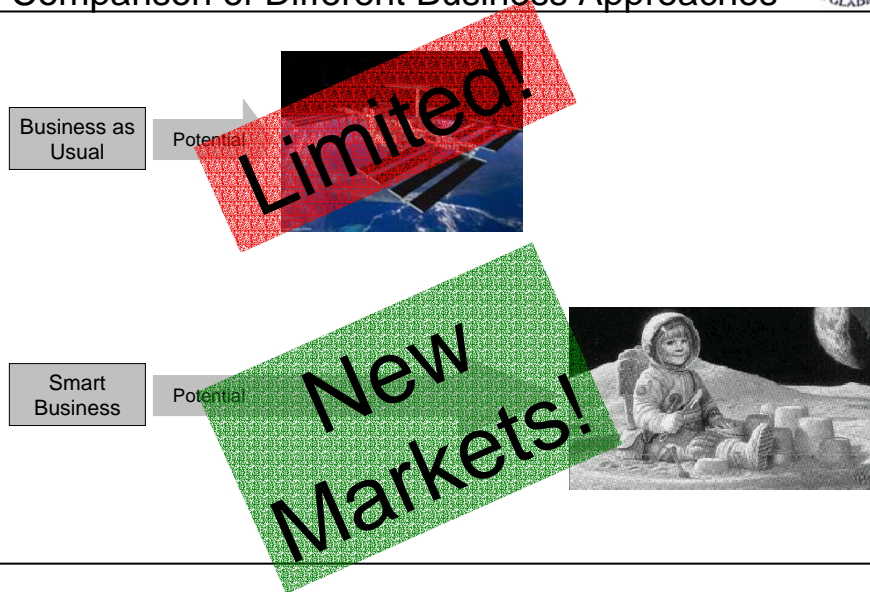
Assumption for Long-term Aspects

No. 5



Potential of Cost Engineering

Comparison of Different Business Approaches



Cost Engineering

Smart Business Strategies

No. 7



| Development | Production | Operation |
|------------------------|------------------------|-----------------------|
| Program Organization | Annual Production Rate | Pre-launch Operations |
| Type of Contract | Timing | Catastrophic Failure |
| Annual Funding Profile | Engine Chamber | Refurbishment |
| Schedule Deviation | Propellant Combination | Launch Site Support |
| Rapid Prototyping | | Flight Rate |
| Technology Readiness | | Payload Capability |
| Step-by-Step Method | | |
| Mass Estimates | | |
| Vehicle Concept | | |
| Engine Overdesigning | | |

Potential of Cost Engineering

Comparison of Business Case Studies

No. 8



| Vehicle | Phase | Business as Usual | Smart Business | Savings |
|------------------|-------------------------|-------------------|----------------|---------|
| Hopper Plus | Development | 14,7 B\$ | 7,9 B\$ | 46 % |
| | Production (first unit) | 1,2 B\$ | 0,6 B\$ | 50 % |
| | Operation (average) | 30 M\$/launch | 5,6 M\$/launch | 81 % |
| Kankoh Maru Plus | Development | 14,2 B\$ | 9,7 B\$ | 32 % |
| | Production (first unit) | 0,8 B\$ | 0,6 B\$ | 25 % |
| | Operation (average) | 24 M\$/launch | 2,7 M\$/launch | 89 % |

Limits to Realize Cost Engineering

No. 9



- Manager and politicians are sceptical for novel changes.
Example: NASA budget.
- It takes much time to change the employee's way of thinking.
Example: NASDA, NAL and ISAS merging to JAXA.
- Due to political restrictions, it is not possible to realize all strategies.
Example: Airbus factories limitations.
- Due to budget limitations, it is not possible to realize optimal design.
Example: Space Shuttle.
- Due to sometimes quick priority changes in politics, it is not possible to use the full potential of cost saving strategies.
Example: Apollo program, Energia program.

Definition

Definition of Cost Engineering (Practice)

No. 10



Case C

- *Step 11: Prepare an action plan on how to implement cost engineering philosophy to existing aerospace industries or organizations.*



Dr.-Ing. Robert Alexander GOEHLICH
Keio University
Department of System Design Engineering
Space System Engineering (Ohkami Laboratory)
3-14-1 Hiyoshi, Kohoku-ku
Yokohama 223-8522, JAPAN
email: mail@robert-goehlich.de
Mobile: +81-(0)90-1767-1667
Fax: +81-(0)45-566-1778
Internet: <http://www.robert-goehlich.de>