Controlling in highly competitive high-tech industries
Dominik Asam, CFO
16 May 2017
Agenda

1. Characteristics of semiconductor industry
2. Introduction to Infineon
3. Controlling at Infineon
4. Lessons learned from implementation of R&D controlling
5. Forecasting in a capital-intensive and volatile business
More with less: semiconductors are vital building blocks in various crucial areas of life

More **energy** with less **resources**

More **performance** with less **energy**

More **mobility** – safe and with less **CO₂**

More **security** at lower cost
About 45% of the OECD Economic growth since 1985 comes from increased productivity; electronics is a key driver for this growth. Up to 80% of innovation in automotive is enabled by semiconductors, even more when it comes to Hybrid and EV.

Source: DECISION, ESIA, Future Horizons, IMF, WSTS 2010, AUDI, OECD Factbook 2013, Infineon
Capital intensity is slightly declining but very high compared to other industries.

Worldwide Semiconductor Capital Spending

Calendar years.

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Wafer diameter is a key lever for cost reduction but also drives scale of factories.

Larger wafer diameters

Wafer Transition
100mm → 125mm 56%
100mm → 150mm 125%
125mm → 150mm 44%
150mm → 200mm 78%
200mm → 300mm 125%
300mm → 450mm 125%

Area Increase


Source: Intel, SEMI ISS 2013
Shrink of feature size as another key lever for cost reduction hits economical limits

Moore’s Law - scaling for more than 20 generations: often assumed to be at the end but survived - now stalling!? 

Scaling of Gate Length

Cost per Transistor Scaling

No cost/transistor crossover for first time at 28 → 20nm transition expected. But system integration is still a driver.

Source: Lisa Su, AMD, ISSCC '13 Keynote
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Leadership in system understanding will foster future growth

Competitive advantages

System leader in Automotive

#1 and technology leader in Power

Leader in Security Solutions

Leading in system-crucial categories

› Advanced Driver Assistance System (ADAS) - Infineon AURIX™ μC, the central processing unit responsible for all safety relevant decisions

› Sensors – pressure, magnetic and radar sensors for safety and comfort features

› CO₂ reduction – Infineon enables energy efficient and compact designs in all areas requiring electronics

Courtesy: BMW Group
Leadership in system understanding will foster future growth

**Competitive advantages**

- **System leader in Automotive**
- **#1 and technology leader in Power**
- **Leader in Security Solutions**

**Broad product & technology portfolio**

- System leader with digitalization of the control loop and functional integration
- 300mm thin-wafer manufacturing for power semiconductors
- Leader in next-generation power semiconductor materials GaN and SiC
Leadership in system understanding will foster future growth

**Competitive advantages**

- **System leader in Automotive**
- **#1 and technology leader in Power**
- **Leader in Security Solutions**

**Mobile Communication & IoT Security**

- Hardware based security for
  - Compliance with security mechanisms determined on application level
  - Secure & trusted environment for data storage and code execution
  - Protection against manipulation, access and theft of secrets
- Machine-to-Machine communication as backbone for reliable operation
Infineon’s revenue development (excl. IRF) outperformed total semi market

Based on Infineon’s portfolio (excl. Other Operating Segments and Corporate & Eliminations) per end of FY16.

If International Rectifier had been consolidated since 1 Oct 2014, Infineon would have recorded revenues of €6,059m in FY15.

Source: Infineon; WSTS (World Semiconductor Trade Statistics), November 2016
Infineon increased relative market share in power and outperformed chip card market

### Automotive Semiconductors
Total market in 2016: $30.2bn

- NXP: 14.0%
- Infineon: 10.7%
- Renesas: 9.8%
- Texas Instr.: 7.8%
- STMicro: 7.4%

Source: Strategy Analytics, April 2017

### Power Discretes and Modules
Total market in 2015: $14.8bn

- Infineon: 18.7%
- Mitsubishi: 6.3%
- Fairchild: 6.1%
- STMicro: 5.7%
- Vishay: 5.0%

Source: IHS Markit, October 2016

### Smart Card ICs
Total market in 2015: $2.72bn

- NXP: 30.5%
- Infineon: 24.8%
- Samsung: 16.2%
- STMicro: 15.1%
- CEC Huada*: 10.4%

Source: IHS Markit, July 2016

* including SHHIC (in 2015, SHHIC was acquired by CEC Huada.)
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## Main controlling KPIs at Infineon

### Management Board
- Segment Result Margin
- Revenue growth
- FCF from continuing operations
- Return on capital employed

### Divisions
- Segment Result Margin
- Revenue growth
- Gross Margin
- R&D-to-Sales

### Operations
- CapEx-to-Sales
- Gross Margin

### Central Functions
- G&A-to-Sales
- S&M-to-Sales

### Employees
- Segment Result Margin*
- FCF from continuing operations
- Return on capital employed

*Segment result margin of respective Division or revenue-weighted average of all Divisions if employee works in Operations or Central Functions
Semiconductor industry characteristics

› Asset Intense Industry

› Long Production Lead Time

› Significant Demand Fluctuation

› Early in the Value Chain
Three major stakeholders in Infineon’s planning process

Regions

Four Divisions

Operations

Regional Account Teams

P&L Responsibility

Global Production and Distribution Network

Uncapped Demand

Consolidated Demand and Release

Capacity & Supply
Stakeholders are aligned within one planning cycle

**Planning Cycle**

- **Demand**
  - Uncapped Demand Signal
  - Price Planning

- **Load**
  - Consolidated but still Uncapped Demand
  - Flexibility Planning
  - Stock and Contingency Planning
  - Review of Resulting Load to Resources

- **Capacity**
  - Invest Proposals
  - Capacity Feedback

- **Adjust & Release**
  - Invest Decisions/Reservations
  - Adjusted Plan for Demand, Load and Capacity

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Multidimensional big picture within online planning cube for integrated decision making

Demand/Product View
- Volume, Price, Revenue
- Region, Currency

Resource View
- (Allocated) Capacity
- Reserved Capacity
- Idle Capacity

Load View
- Load for Revenue
- Load for Stock
- Inventory

All Planning dimensions are available and aligned at all planning steps
Adding Financial Key Parameters to Planning Cube translates it into a Financial Statement

Financial Parameters Sourced from Finance Systems

- Price per Piece
- Cost per Piece
- Cost per Idle Capacity Unit
- ...

Volume related inputs to Financial Forecast Statement

- Revenue
- Cost
- Margin
- Idle Cost
- Inventory Value
- ...

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Multidimensional picture for controlling landscape

Production Network
› Flexibility
› Stock development

Customer Demand
› Volume
› New Products

Production Site
› Capacity
› Utilization
› Idle Cost
› Necessary Invests

Product
› Currency
› Regional Split
› Price
› Cost of Sales

Around 4 months cycle time

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What projects do we invest our R&D money in and how profitable are they?

The PPL lies at the core of our financial R&D project controlling...
Purpose of a Product Plan - PPL

PPL predicts the contribution to financial targets with respect to profitability and growth potential.

PPL is a financial tool to support systematic reviews during the lifecycle of a product.

PPL serves visibility for assigned entrepreneurs to react fast on increasing market dynamics.

A PPL is a joint commitment of...

- Sales & Marketing on future customer projects in terms of price, volume and product specifications.
- Operations regarding future manufacturing cost.
- R&D regarding project timeline, resource commitment and project cost development.
- Finance.
Replace excel by a system –
the three key elements of ePPL 2.0

Data sources
Calculation Tool
Reporting

OCC

BI Portal

ePPL 2.0 DB
KPI: PPL Execution

- Measure for project planning accuracy
- Measure for actual time-to-market
MI: Strategic 5-year plan vs. R&D pipeline coverage

How much revenue is planned with products which are currently under development (Milestone 3 - Milestone 9) during 5-year planning timeframe, what is the risk profile (execution, time to market) of the plan

Measurement: Coverage of revenue with products currently under development

Project categories: 1) Expedition: Dynamic boundary conditions, high level of uncertainties. 2) Mission: Possible changes to boundary conditions, significant but manageable uncertainties. 3) Autobahn: Stable boundary conditions, low level of uncertainties.
KPI: Conversion rate of R&D into revenue

How does a project/product contribute to growth and profitability of a Division/Business Line/Product Line?

What is the conversion rate of an R&D investment into revenue, what is the profitability compared to the segment targets / expectation?

Measurement 1: Conversion rate of 1€ project specific R&D into X€ cum. revenue
Measurement 2: Øproduct-cost-margin of product/project compared to targets in 5y-plan
Measurement 3: Planning stability between Milestone 3 and Milestone 9

Div / BL / PL specific aggregation
Lessons learned during PPL roll out

› Ease of use and value add required to provide incentive for adoption “bottom up”
  – Certain simplifications to be jointly agreed in the finance community to reduce the degree of complexity
  – Data available in other systems needs to be automatically fed into the system to reduce workload
  – User interface needs to be convenient and fast

› Tone from the top both by the technical and finance side required to support roll out “top down”
  – Improved transparency in an area which is at the core of the decision power of the divisions not always welcome (potential fear of increased top down interference)
  – It takes a considerable time before contents provide full benefit in terms of controlling
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The quantity of data that is generated today and has become available

The speed at which data is generated has increased vastly

The sheer variety/types of data that is available today has increased

The inconsistency which can be shown by the data at times

The data is often unstructured and not linked, connected or correlated

The proliferation of data has the potential to change how we think of business strategy
Exploratory Data Analysis
A few of the key data points considered

- New Orders Trend Analysis (Quarterly)
- New Orders Trend Analysis (Weekly)
- Order cancellations Trend Analysis (Q & Wly)
- Credit Notes Trend Analysis (Q’ly & Weekly)
- HFM Adjustments Analysis
- S&D Notes Trend Analysis (Q’ly & Weekly)
- Number of Days (Sales) Impact on Revenue
- Revenue Composition Analysis
Infineon Group revenue prediction model construct

Model Construct

<table>
<thead>
<tr>
<th>Variables for Adjustments</th>
<th>Variable for Reference</th>
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<tbody>
<tr>
<td>HFM Adjustments</td>
<td>FRFC Forecast</td>
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<tr>
<td>Other Adjustments</td>
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<table>
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<tr>
<th>Currency Exchange</th>
<th>Derived Variable</th>
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<tr>
<td>Month End Rate</td>
<td>Revenue Run rate</td>
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<table>
<thead>
<tr>
<th>Data Source: CEBIS</th>
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<tr>
<td>(Granularity: Weekly)</td>
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<table>
<thead>
<tr>
<th>Revenue Estimate</th>
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<tr>
<td>Revenue Quantity</td>
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<table>
<thead>
<tr>
<th>Order Backlog</th>
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<tr>
<td>New Orders Received</td>
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<tr>
<td>Order Cancellations</td>
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<th>Customer Forecast</th>
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<table>
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<tr>
<th>Revenue (Order Development)</th>
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</table>

| Revenue Prediction          |

IFX Group Prediction Model: Major Features

I. Consistent Data Integrity & Quality checks and Profiling

II. Variable / Feature selection and extensive Exploratory data Analysis

III. Quarterly & Mid-Quarter Iterations with close feedback loops and Regular model evolution

IV. Emphasis on ‘Complexity reduction’, ‘Mathematical validation’ & ‘Avoidance of over-fitting’

V. High levels of Prediction Accuracy with Actionable Insights

VI. Embedding the Outcome of the Analytical Model in IT Solutions for Business consumption
IFX Group Revenue Prediction Model
Multi-iterations with High Prediction Accuracy

Base Model
Model with core variables: Cash Flow, Order Backlog, New Orders, Credit Notes & Order Cancellation etc.

Advance Model
Two distinct prediction models for euro and non-euro 'Revenue' components; using Month-end Exchange Rate & RFC Exchange Rate

Operationalization (Advance Model)
End to End automation and result integration with CEBIS

Next Level
In – Progress
Advance Algorithm and Model Refresh

Iteration – I & II
Oct’15-Jan’16

Iteration – III, IV, IVA, V
Apr’16-Jul’16-Oct’16

Iteration – VI, VIA
Jan’17

Future Iterations...

Prediction Accuracy
Oct’15: 0.7%
Jan’16: 1.5%

Apr’16: 1.8 -2.6%
Jul’16: 0.7 - 1%
Oct’16: 1.3 – 2.4%

to be updated after FY1617 Q2 Closure

Next Level
Thank you for your attention
Part of your life. Part of tomorrow.