SIEMENS
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SEC510 - Enerji Sektöründe Mühendislik

Enerji Piyasası Stratejiler ve Ekonomi

Süha IŞIKLI

27 Şubat 2020, Hacettepe Üniversitesi

Hacettepe Üniversitesi Enerji Sektöründe Mühendislik Ders İçerikleri (1/2)

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Haftalar	İşlenecek Konular	İçerik
1. Hafta	Ders Tanıtımı	▪ Ders programı ve ders içerikleri ▪ Dersten beklentiler ▪ Siemens hakkında genel bilgilendirme ▪ Genel soru cevap
2. Hafta	Enerji Piyasası Stratejiler ve Ekonomi	▪ Pazar tanımı ve hesaplama yöntemleri ▪ Türkiye enerji ve elektrik pazarı ▪ Strateji oluşturma ve hedef belirleme ▪ İşletmeyi oluşturma ve yönetim
3. Hafta	Elektrik ve Güç Sistemlerine Giriş ve Güç Üretimi Temelleri	▪ Güç ve Enerji nedir ▪ Elektrik üretimi ▪ Elektrik santrallerinin temelleri ▪ Enerji kaynaklarına göre türbinlerin çalışma prensipleri
4. Hafta	Kalite Yönetimi & İş Sağlığı ve Güvenliği	▪ Kalitenin tanımı ve kalite standartlarının gelişimi ▪ Kalite yönetim sistemi ve araçları ▪ PM@Siemens ▪ İş Sağlığı ve Güvenliği temelleri ve uygulamaları
5. Hafta	Akıllı Şebekeler ve Enerji Yönetim Sistemleri	▪ Enerjinin yönetilmesi ▪ Akıllı şebeke sistemleri ▪ Dağıtım sistemlerinin teknik altyapı hesaplamaları
6. Hafta	Enerji Santrallerinde Otomasyon Mühendisliği	▪ Otomasyonun tanımı ve elektrik santrallerinde kullanımı ▪ Otomasyon sisteminin bileşenleri ▪ Santral otomasyonunun mühendisliği ve projelendirilmesi

Hacettepe Üniversitesi Enerji Sektöründe Mühendislik Ders İçerikleri (2/2)

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Haftalar	İşlenecek Konular	İçerik
7. Hafta	Temel Elektrik Mühendislik Hesapları ve Koruma	▪ Farklı kaynaklara göre santrallerin elektrik altyapısı ▪ Santrallerin elektrik altyapı bileşenleri ▪ Santrallerin elektrik altyapısının mühendisliği
8. Hafta	Satış Yönetimi ve İş Geliştirme & Teklif Süreçleri	▪ Fırsat yaratma ve satış planı (funnel) oluşturma ▪ Rakip analizi ve değer yaratma ▪ Teklif hazırlama, pazarlık ve kontrat hazırlama
10. Hafta	Proje Yönetimi	▪ Proje yönetiminin temelleri ▪ Proje yönetim süreçleri ▪ Proje yöneticisinin tanımı
11. Hafta	Tedarik Zinciri Yönetimi	▪ Satın alma süreçleri ▪ Proje satın alması ▪ Tedarikçi ve tedarik zinciri yönetimi
12. Hafta	Kurulum ve Işletmeye Alma	▪ Saha yönetimi ▪ Kurulum ve devreye alma süreçleri ▪ Saha aktiviteleri ve mühendislerden beklentiler
13. Hafta	Enerji Saha Servis Faaliyetleri	▪ Servis anlaşmaları ve uzun süreli servis hizmetleri ▪ Garanti süreci ve emre amadelik ▪ Arıza teşhis yöntemleri ve saha servisleri
14. Hafta	Finansal Perspektif / Gelecek Trendler ve İnsan	▪ Satış ve proje işlerinde ticari süreçlerin yönetimi ▪ Ticari yöneticinin sorumlulukları ▪ Siemens'te insan kaynakları ▪ Gelecek trendlerin Siemens'te yönetimi

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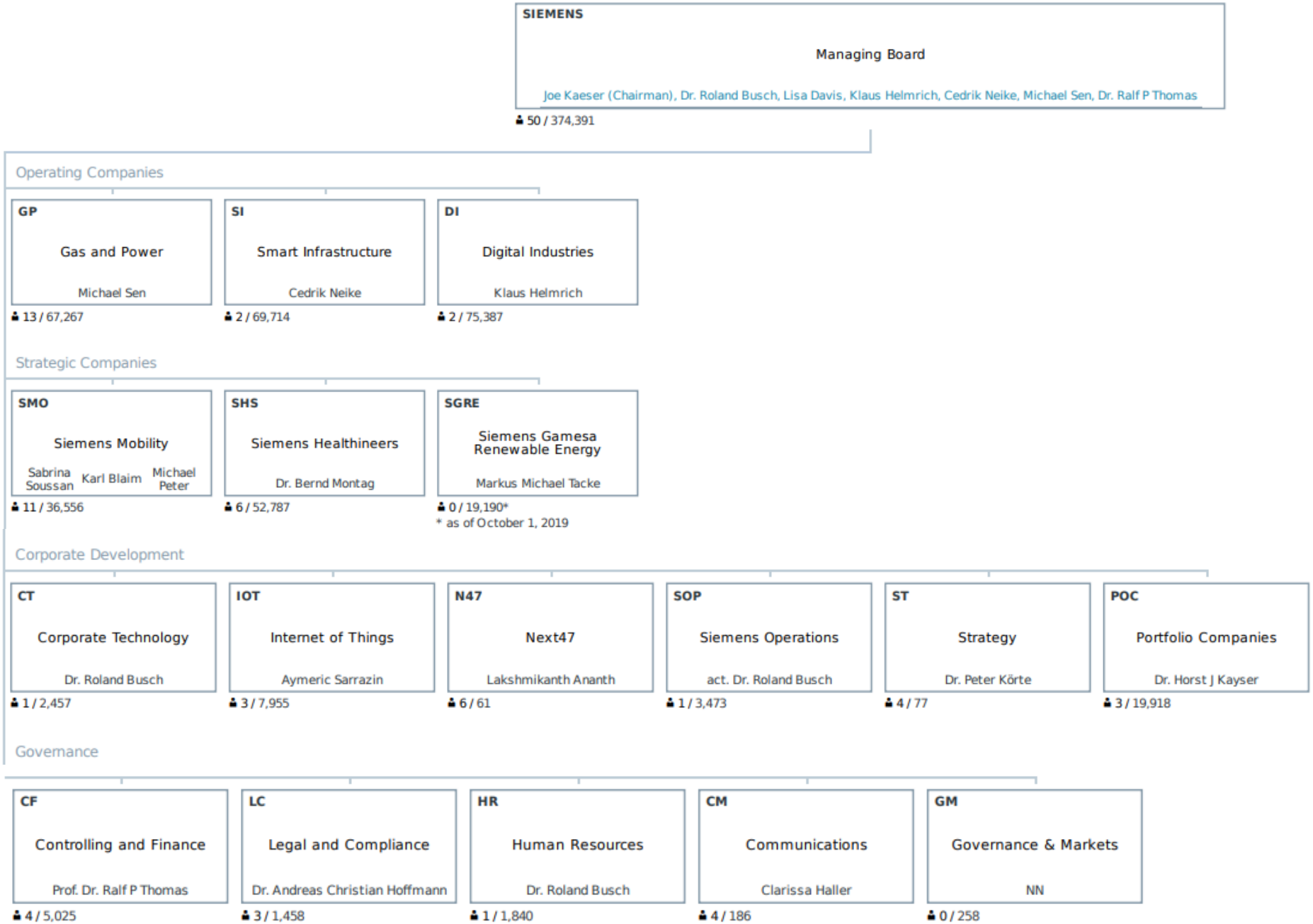
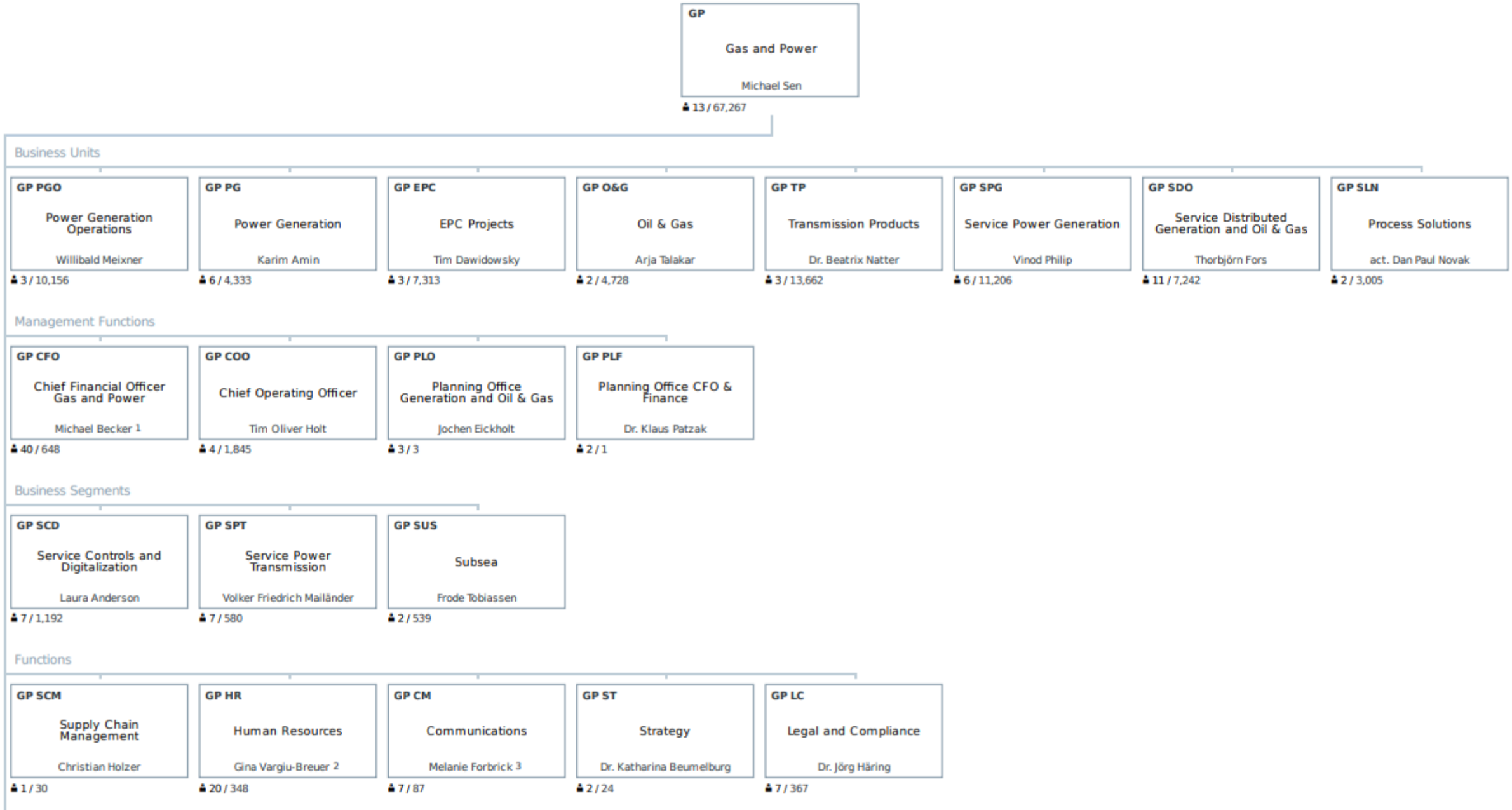
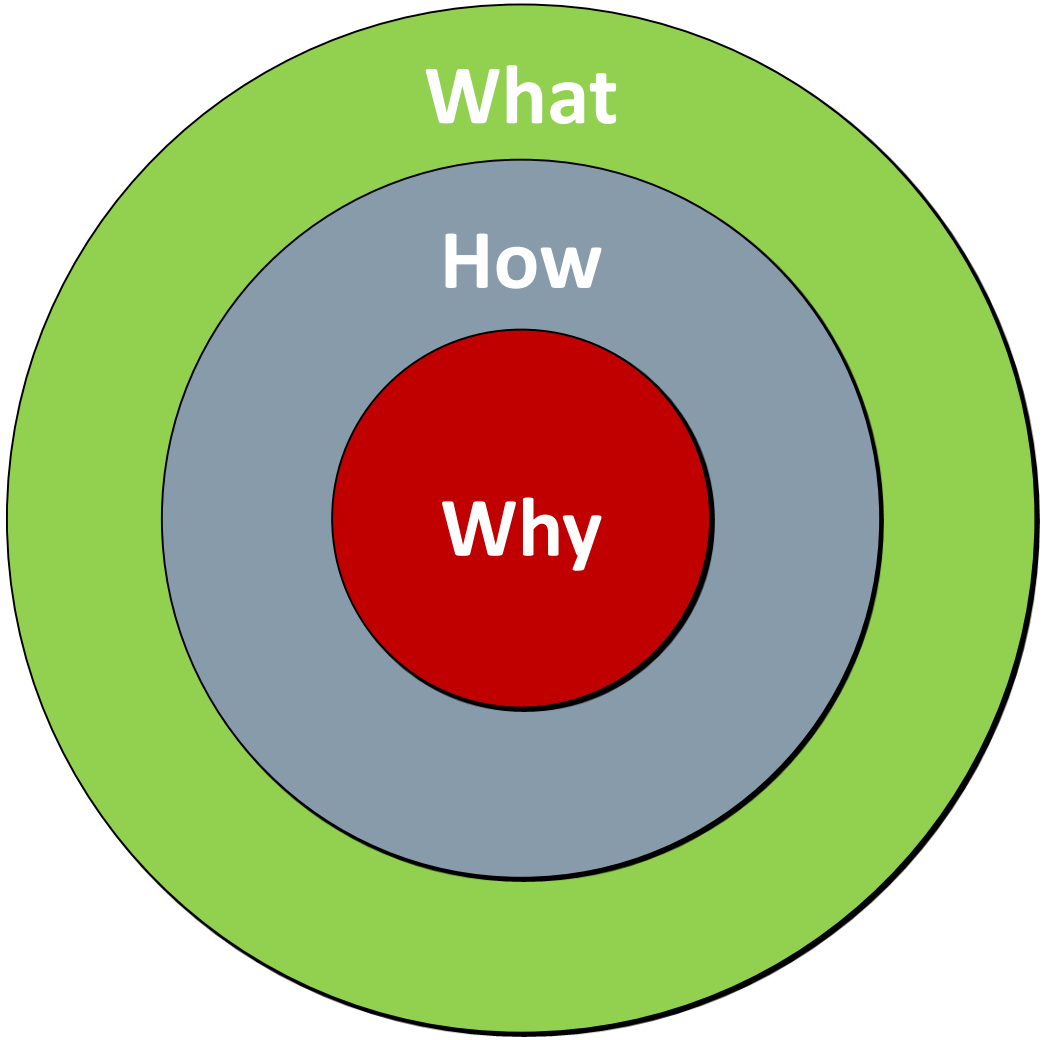
Bölüm:01

Strateji

STRATEJİ


SIEMENS
Managing Board
Joe Kaeser (Chairman), Dr. Roland Busch, Lisa Davis, Klaus Helmrich, Cedrik Neike, Michael Sen, Dr. Ralf P Thomas
50 / 374,391
Operating Companies
GP
Gas and Power
Michael Sen
13 / 67,267
SI
Smart Infrastructure
Cedrik Neike
2 / 69,714
DI
Digital Industries
Klaus Helmrich
2 / 75,387
Strategic Companies
SMO
Siemens Mobility
Sabrina Soussan
Karl Blaim
Michael Peter
11 / 36,556
SHS
Siemens Healthineers
Dr. Bernd Montag
6 / 52,787
SGRE
Siemens Gamesa Renewable Energy
Markus Michael Tacke
0 / 19,190*
* as of October 1, 2019
Corporate Development
CT
Corporate Technology
Dr. Roland Busch
1 / 2,457
IOT
Internet of Things
Aymeric Sarrazin
3 / 7,955
N47
Next47
Lakshmikanth Ananth
6 / 61
SOP
Siemens Operations
act. Dr. Roland Busch
1 / 3,473
ST
Strategy
Dr. Peter Körte
4 / 77
POC
Portfolio Companies
Dr. Horst J Kayser
3 / 19,918
Governance
CF
Controlling and Finance
Prof. Dr. Ralf P Thomas
4 / 5,025
LC
Legal and Compliance
Dr. Andreas Christian Hoffmann
3 / 1,458
HR
Human Resources
Dr. Roland Busch
1 / 1,840
CM
Communications
Clarissa Haller
4 / 186
GM
Governance & Markets
NN
0 / 258


GP
Gas and Power
Michael Sen
13 / 67,267
Business Units
GP PGO
Power Generation Operations
Willibald Meixner
3 / 10,156
GP PG
Power Generation
Karim Amin
6 / 4,333
GP EPC
EPC Projects
Tim Dawidowsky
3 / 7,313
GP O&G
Oil & Gas
Arja Talakar
2 / 4,728
GP TP
Transmission Products
Dr. Beatrix Natter
3 / 13,662
GP SPG
Service Power Generation
Vinod Philip
6 / 11,206
GP SDO
Service Distributed Generation and Oil & Gas
Thorbjörn Fors
11 / 7,242
GP SLN
Process Solutions
act. Dan Paul Novak
2 / 3,005
Management Functions
GP CFO
Chief Financial Officer Gas and Power
Michael Becker 1
40 / 648
GP COO
Chief Operating Officer
Tim Oliver Holt
4 / 1,845
GP PLO
Planning Office Generation and Oil & Gas
Jochen Eickholt
3 / 3
GP PLF
Planning Office CFO & Finance
Dr. Klaus Patzak
2 / 1
Business Segments
GP SCD
Service Controls and Digitalization
Laura Anderson
7 / 1,192
GP SPT
Service Power Transmission
Volker Friedrich Mailänder
7 / 580
GP SUS
Subsea
Frode Tobiassen
2 / 539
Functions
GP SCM
Supply Chain Management
Christian Holzer
1 / 30
GP HR
Human Resources
Gina Vargiu-Breuer 2
20 / 348
GP CM
Communications
Melanie Forbrick 3
7 / 87
GP ST
Strategy
Dr. Katharina Beumelburg
2 / 24
GP LC
Legal and Compliance
Dr. Jörg Häring
7 / 367



Global trends are creating our market's challenges

Global trends lead to increased energy demand

Demographic change

9.6 BN

increase in the earth's population in 2050 from 7.3 billion people today. Average life expectancy will then be 82 years.

Urbanization

70%

of the world's population will live in cities by 2050 (2009: 50%).

Climate change

2013

Scientists measured the highest CO_2 concentration in the atmosphere in the last 800,000 years.

Digitalization

44 ZB

will be reached by the digital universe by 2020 – a 10-fold increase from 2013.

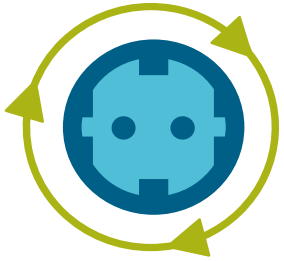
Globalization

2x

Since 2000, the volume of world trade has nearly doubled.

Lead to our market's challenges

Acceptance

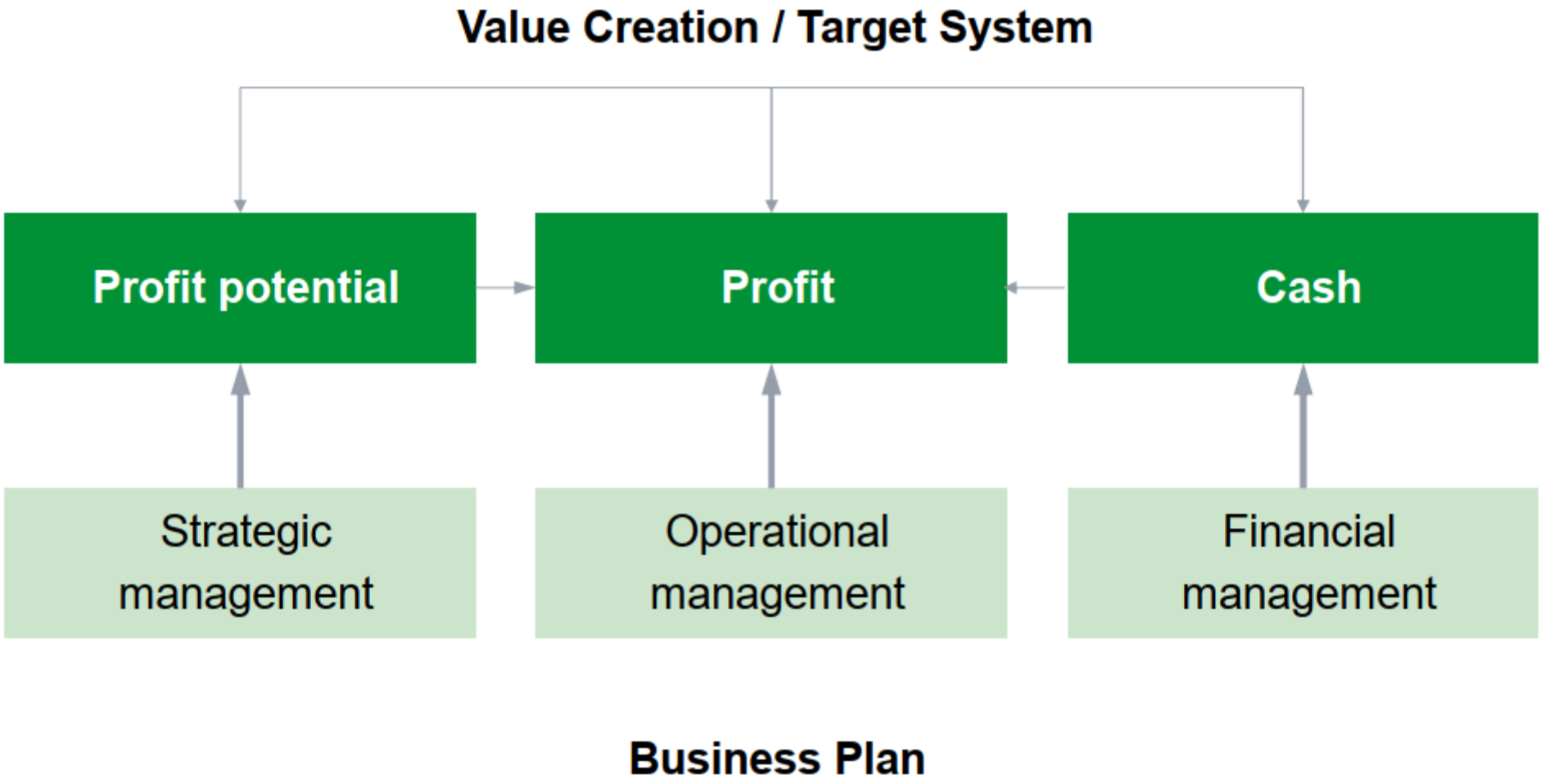


Reliable power supply

Economic efficiency

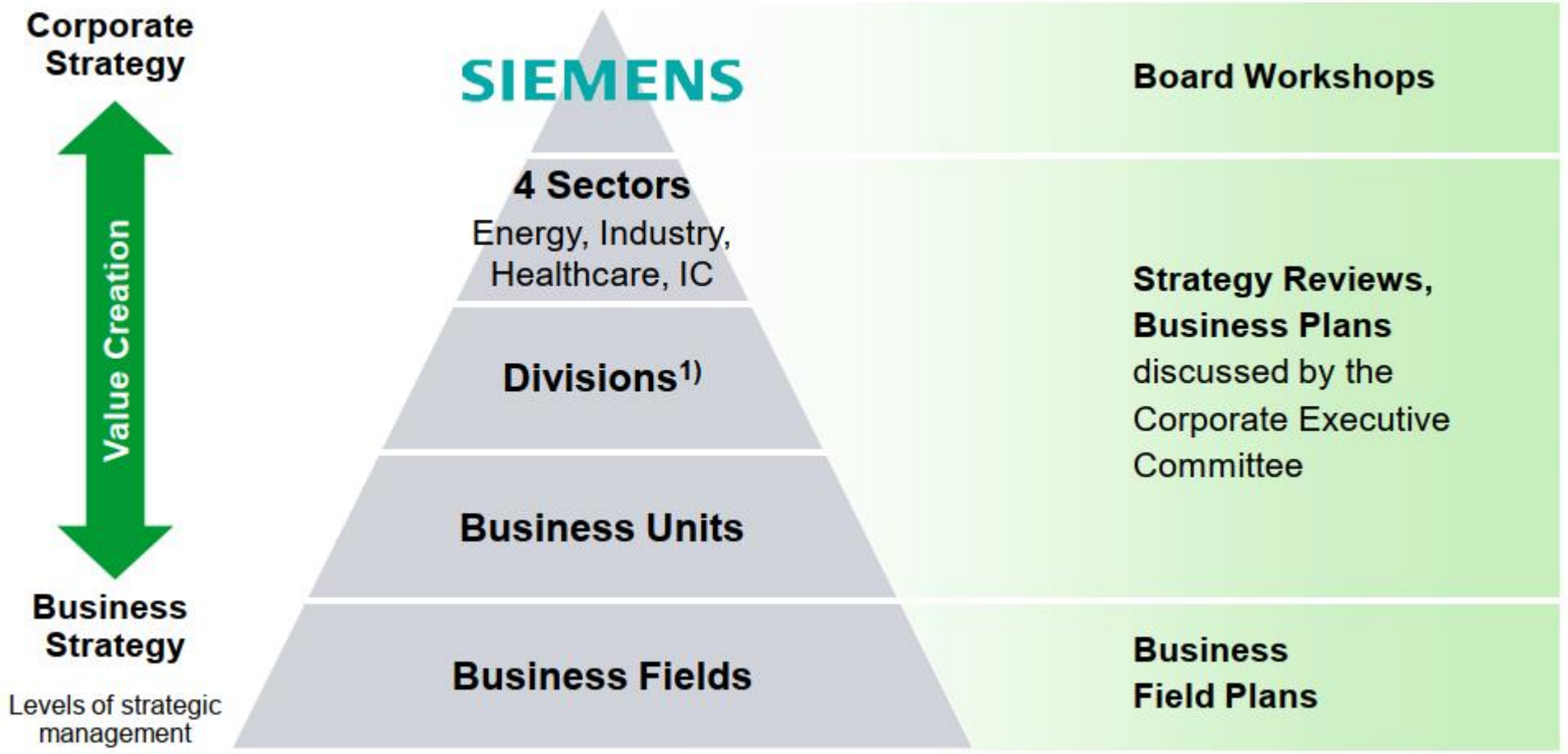
Resource efficiency

Climate protection

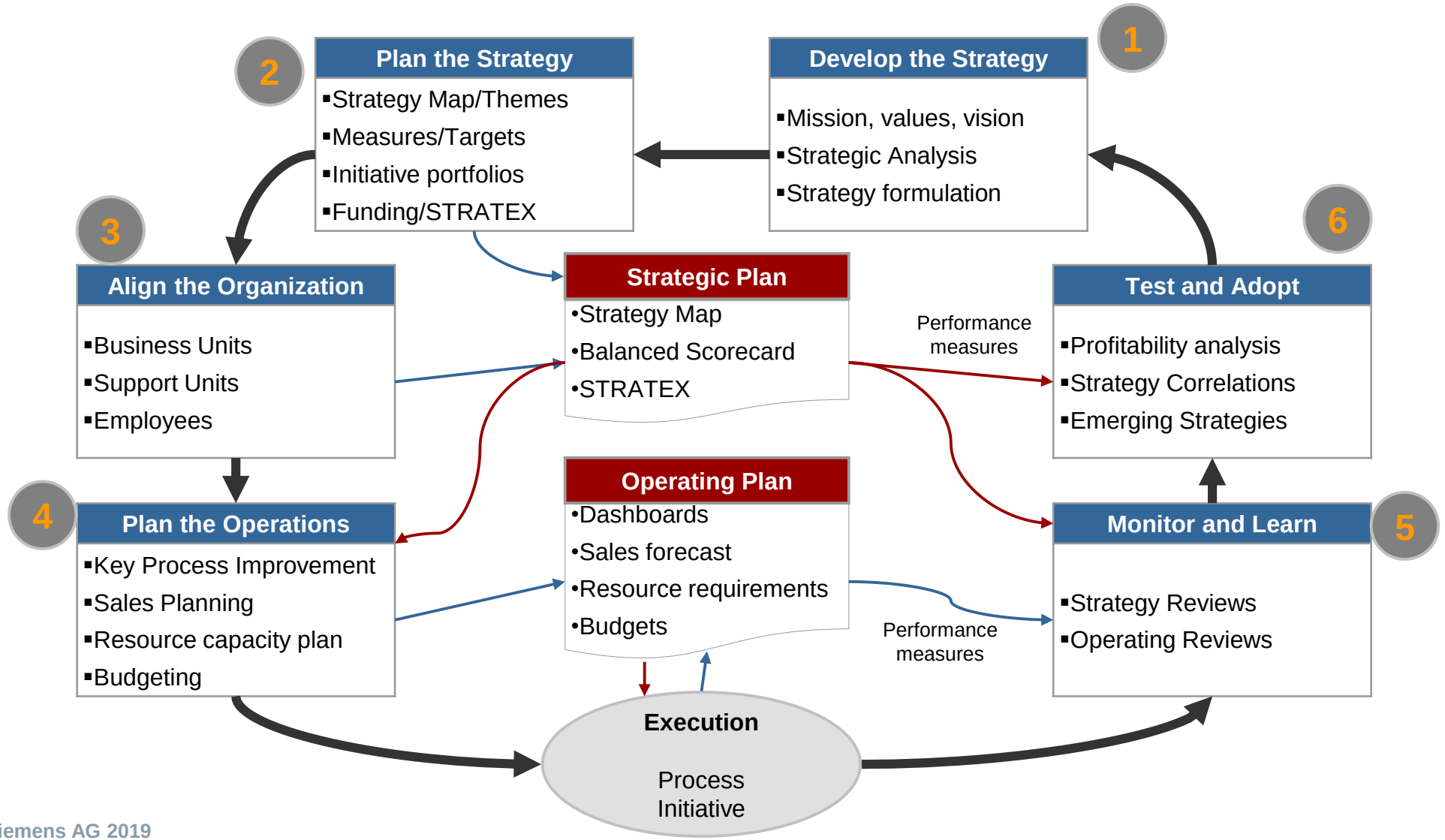


1 Customer's Business Drivers	What are the market factors that are impacting the Customer and causing them to change?
2 Customer's Business Objectives	What is the Customer doing to address these Business Drivers?
3 Customer's Operational Issues	What could prevent the Customer from achieving their Business Objectives? What KPI's does the Customer use to measure progress?
4 Siemens' Solutions	How will we work together with the Customer to enable them to address their Operational Issues?
5 Siemens' Competitors	How are we different from our competition in addressing these Operational Issues?
6 Siemens' References	For which other Customers has Siemens addressed similar Operational Issues and Business Objectives?
7 Siemens' Unique Value	How does the Siemens Solution address the Customer's needs and deliver unique value?

Step	What is my answer so far?	What additional information do I need?
1 Customer' Business Drivers		
2 Customer's Business Objectives		
3 Customer's Operational Issues		
4 Siemens' Solutions		
5 Siemens' Competitors		
6 Siemens' References		
7 Siemens' Unique Value		



Strategic Management System



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Strategic Leadership

Define Action Fields	Analyze External Environment	Analyze Internal Strengths and Weaknesses	Develop Strategy	Implement Strategy	Control Strategy
Define business field & type of business	Analyze total market	Describe position in technologies & competences	Describe new strategy	Align actions & measures	Review strategy
Describe / revise mission	Analyze competition	Describe competitive advantage: strengths & weaknesses	Highlight USP	Agree on targets	Control actions & measures
Assess current business performance	Evaluate market attractiveness	Detect synergy potential	Analyze strategic and financial risks	Finalize business plan	
	Record trends: opportunities & threats	Assess current situation & strategic challenges	Setup draft business plan incl. financial data	Communicate strategy	
	Identify key success factors	Manage business portfolio	Interface to Business Processes, Regions, Shared Serv		

Source: CD S SP

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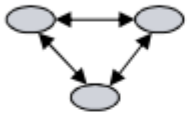
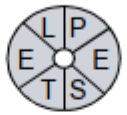
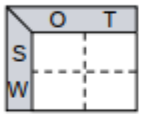
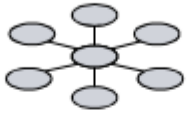
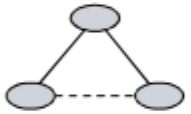
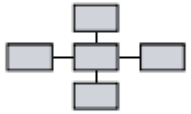
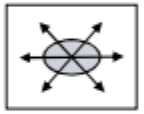
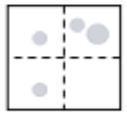
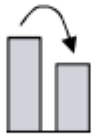
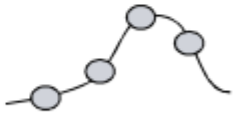
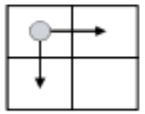
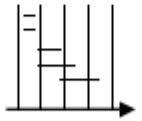
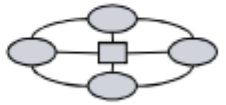
Define Action Fields	Analyze External Environment	Analyze Internal Strengths and Weaknesses	Develop Strategy	Implement Strategy	Control Strategy
Business Field Definition 	Trends 	Competitor Benchmarking 	SWOT 	Stakeholder Mapping 	Discount / Business Value 
Strategic USP 	Market Attractiveness 	Core Competences 	Competitive Strategy 	Alignment 	SMART Targets 
Portfolio 	Market Analysis 	Innovation 	Market Strategy 	Roadmap 	Scorecard 
Performance 	Key Success Factors 	Synergies 	Resource Strategy 	Profit Calculation 	Risk Management 

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Define action fields

Analyze external environment

Analyze internal strengths and weaknesses

Develop strategy

Implement strategy

Control strategy

- What is the definition of the business field / the mission?
- What is the strategic USP of the business?
- What is the business portfolio?
- What is the current business performance?

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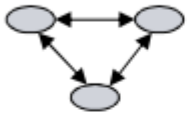
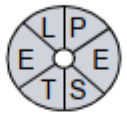
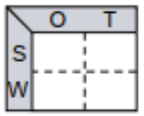
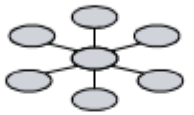
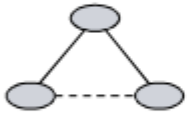
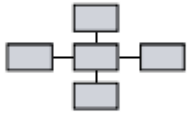
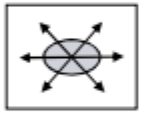
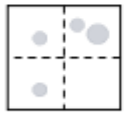
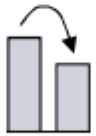
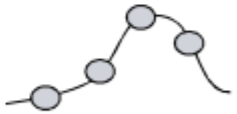
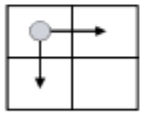
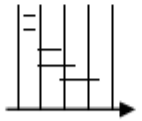
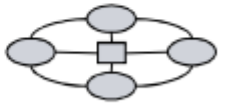
Define Action Fields	Analyze External Environment	Analyze Internal Strengths and Weaknesses	Develop Strategy	Implement Strategy	Control Strategy
Business Field Definition 	Trends 	Competitor Benchmarking 	SWOT 	Stakeholder Mapping 	Discount / Business Value 
Strategic USP 	Market Attractiveness 	Core Competences 	Competitive Strategy 	Alignment 	SMART Targets 
Portfolio 	Market Analysis 	Innovation 	Market Strategy 	Roadmap 	Scorecard 
Performance 	Key Success Factors 	Synergies 	Resource Strategy 	Profit Calculation 	Risk Management 

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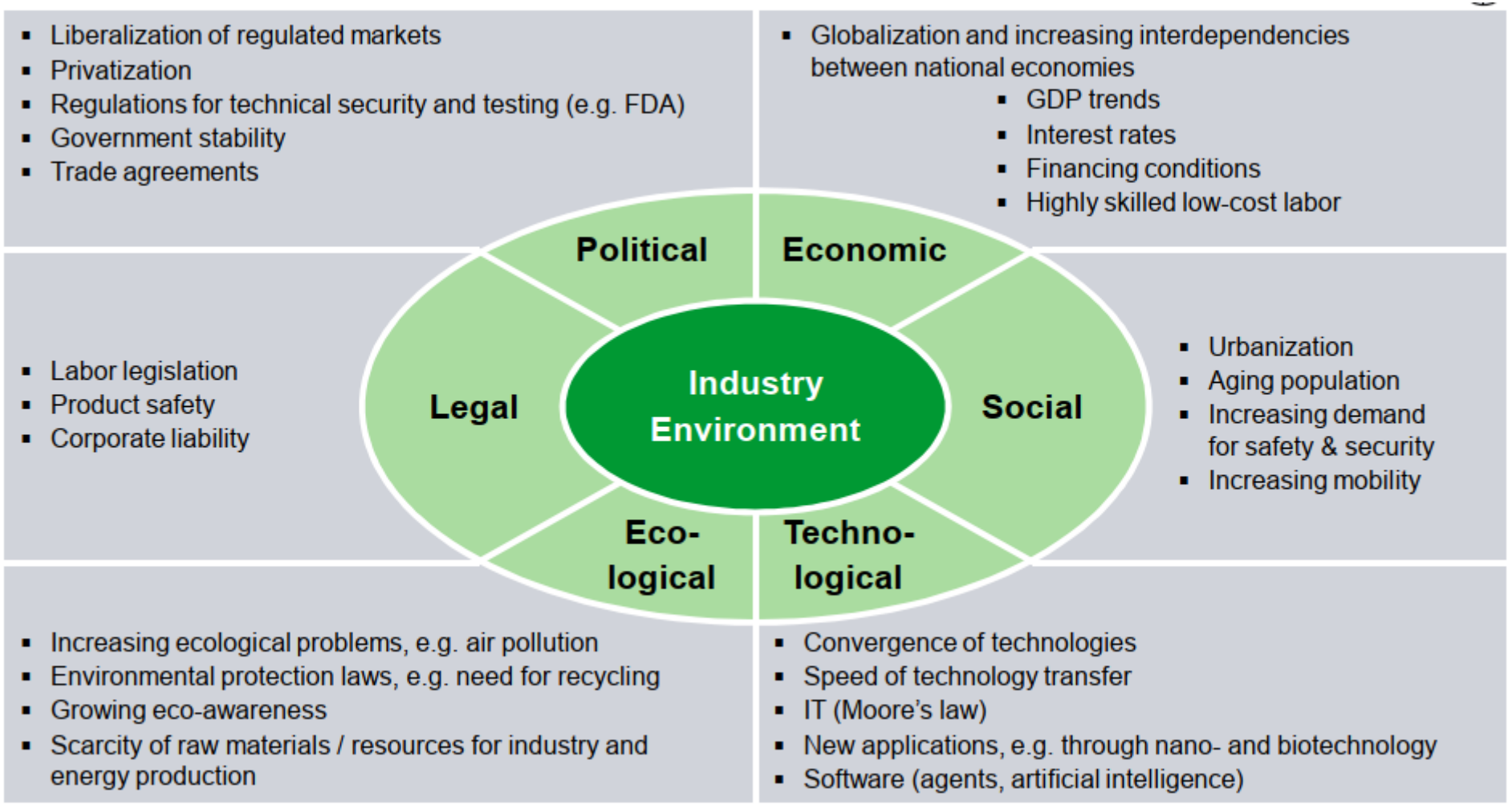
- Define action fields
- **Analyze external environment**
- Analyze internal strengths and weaknesses
- Develop strategy
- Implement strategy
- Control strategy

- What are the trends in the macroeconomic environment?
- How attractive is the industry?
- How big is the market?
- What are the key success factors of the business?



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The threat of entry
▪ Economies of scale ▪ Capital requirement of entry ▪ Access to distribution channels ▪ Experience ▪ Expected retaliation ▪ Legislation or government action ▪ Differentiation

The threat of substitutes
▪ Product-for-product substitution ▪ Substitution of need ▪ Generic substitution

Analyze your opponent, so that you may learn his plans, learn from his successful as well as his failed plans.

Sun Tzu

Competitive rivalry
▪ Competitors are of equal size ▪ Market growth rates ▪ High fixed costs ▪ Addition of extra capacity is in large increments ▪ Undifferentiated products and services ▪ High exit barriers

The power of suppliers
▪ Concentration of suppliers ▪ "Switching costs" from one supplier to another are high ▪ Brand of the supplier is powerful ▪ Possibility of the supplier integrating forwards ▪ Supplier's customers are highly fragmented

The power of buyers
▪ Concentration of buyers ▪ Supplying industry comprises a large number of small operators ▪ Existing alternative sources of supply ▪ Component or material cost is a high percentage of total cost ▪ Cost of switching a supplier is low or involves little risk ▪ Threat of backward integration by the buyer

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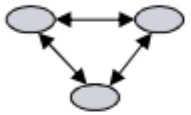
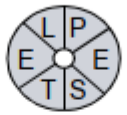
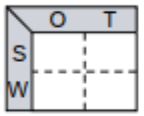
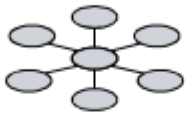
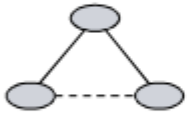
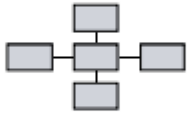
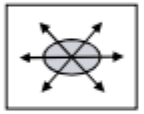
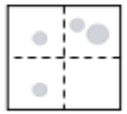
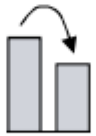
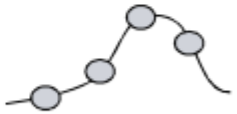
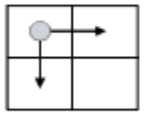
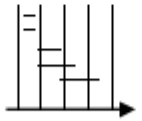
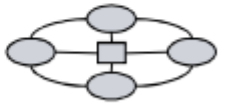
Define Action Fields	Analyze External Environment	Analyze Internal Strengths and Weaknesses	Develop Strategy	Implement Strategy	Control Strategy
Business Field Definition 	Trends 	Competitor Benchmarking 	SWOT 	Stakeholder Mapping 	Discount / Business Value 
Strategic USP 	Market Attractiveness 	Core Competences 	Competitive Strategy 	Alignment 	SMART Targets 
Portfolio 	Market Analysis 	Innovation 	Market Strategy 	Roadmap 	Scorecard 
Performance 	Key Success Factors 	Synergies 	Resource Strategy 	Profit Calculation 	Risk Management 

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Define action fields

Analyze external environment

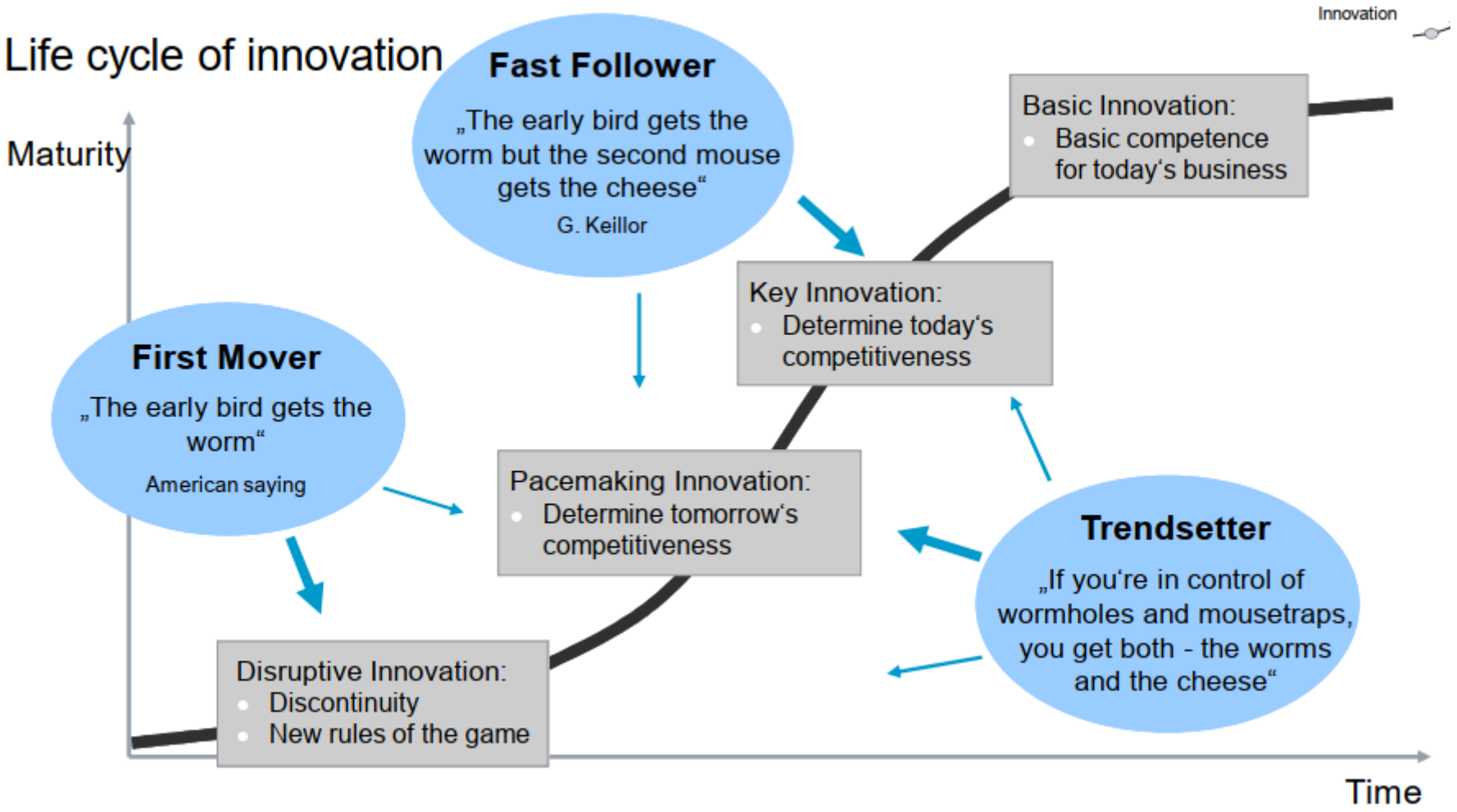
Analyze internal strengths and weaknesses

Develop strategy

Implement strategy

Control strategy

- What competitive advantages are created?
- What core competences do we have?
- What is our position in innovation?
- Where do we realize synergies?



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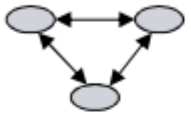
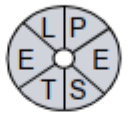
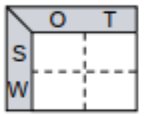
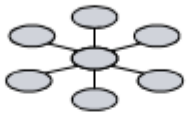
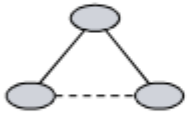
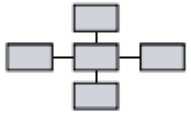
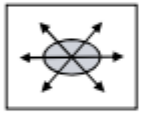
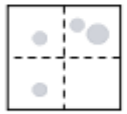
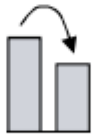
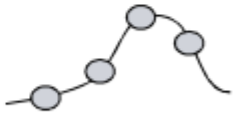
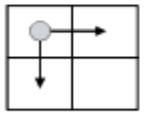
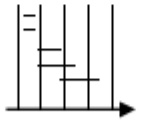
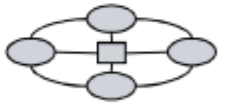
Define Action Fields	Analyze External Environment	Analyze Internal Strengths and Weaknesses	Develop Strategy	Implement Strategy	Control Strategy
Business Field Definition 	Trends 	Competitor Benchmarking 	SWOT 	Stakeholder Mapping 	Discount / Business Value 
Strategic USP 	Market Attractiveness 	Core Competences 	Competitive Strategy 	Alignment 	SMART Targets 
Portfolio 	Market Analysis 	Innovation 	Market Strategy 	Roadmap 	Scorecard 
Performance 	Key Success Factors 	Synergies 	Resource Strategy 	Profit Calculation 	Risk Management 

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Ingenuity for life

- Define action fields
- Analyze external environment
- Analyze internal strengths and weaknesses
- **Develop strategy**
- Implement strategy
- Control strategy

- What strategic response can be derived from SWOT analysis?
- Which competitive strategy do we choose?
- What is the offer / market approach for our business?
- What is the design of our value chain?

and …

- *Is the strategy set consistent?*

Environmental factors / Internal factors	Opportunities ▪ Market deregulation ▪ New business structures ▪ More environmental awareness	Threats ▪ New competitors ▪ Price reduction of 10% p.a. ▪ Market saturated
Strengths ▪ Cash position ▪ R&D knowledge ▪ Market knowledge	**SO strategies** (internal strengths to realize external opportunities)	**ST strategies** (using existing strengths to reduce external threats)
Weaknesses ▪ Cost position ▪ Product complexity ▪ Market penetration	**WO strategies** (reducing internal weaknesses to seize new opportunities)	**WT strategies** (reducing internal weaknesses while avoiding threats)

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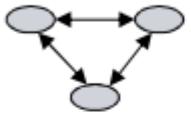
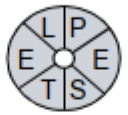
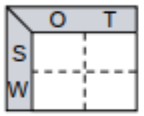
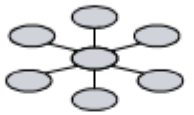
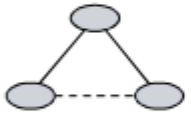
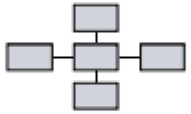
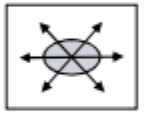
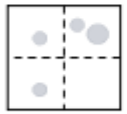
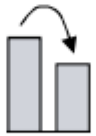
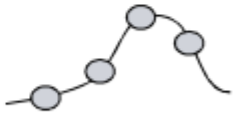
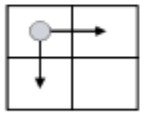
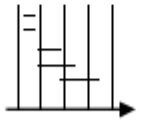
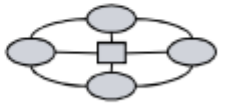
Business Field Definition 	Trends 	Competitor Benchmarking 	SWOT 	Stakeholder Mapping 	Discount / Business Value 
Strategic USP 	Market Attractiveness 	Core Competences 	Competitive Strategy 	Alignment 	SMART Targets 
Portfolio 	Market Analysis 	Innovation 	Market Strategy 	Roadmap 	Scorecard 
Performance 	Key Success Factors 	Synergies 	Resource Strategy 	Profit Calculation 	Risk Management 

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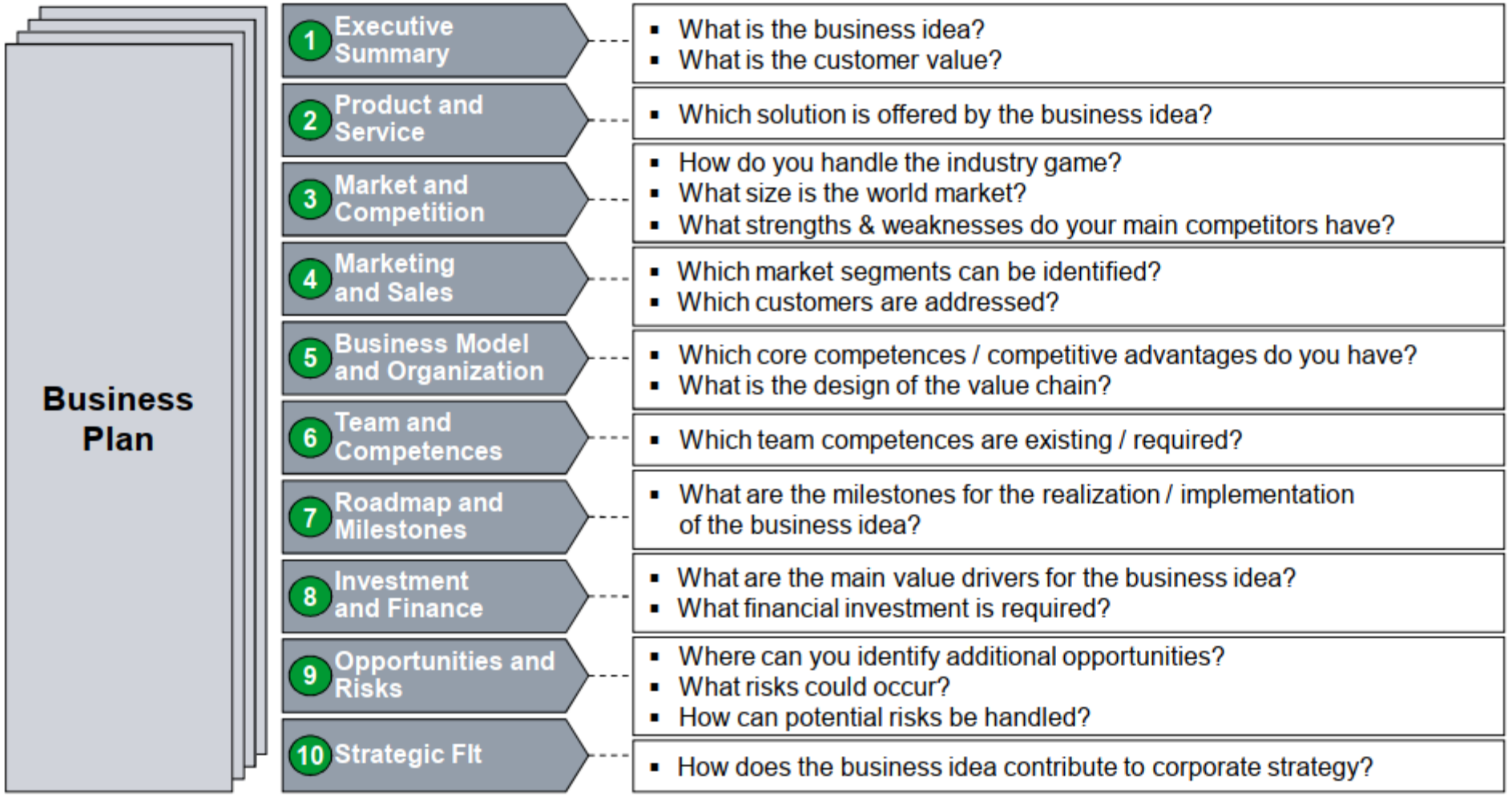
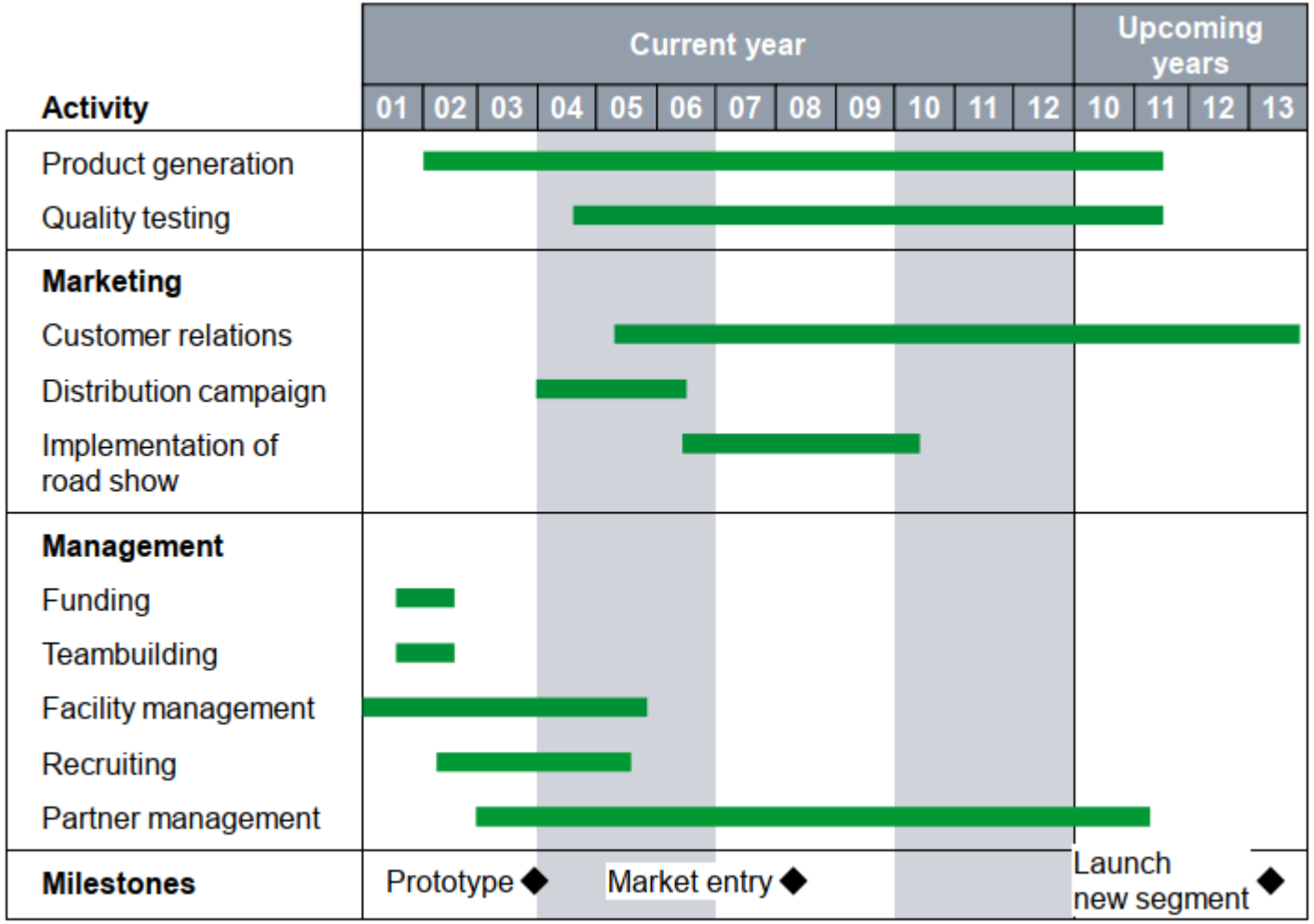
- Define action fields
- Analyze external environment
- Analyze internal strengths and weaknesses
- Develop strategy
- **Implement strategy**
- Control strategy

- Who are the relevant stakeholders?
- How can alignment be created?
- What is the roadmap for implementation?
- What is the impact on profit and cash?





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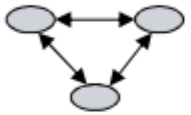
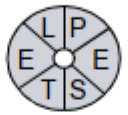
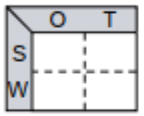
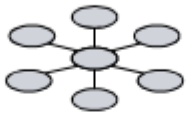
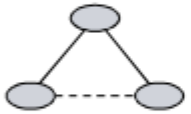
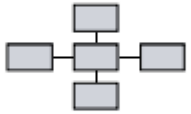
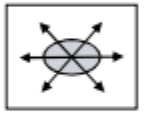
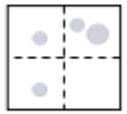
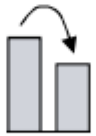
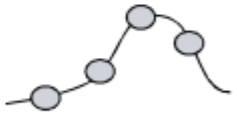
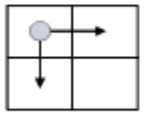
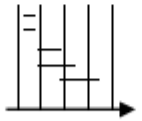
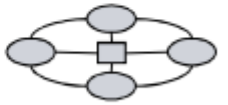
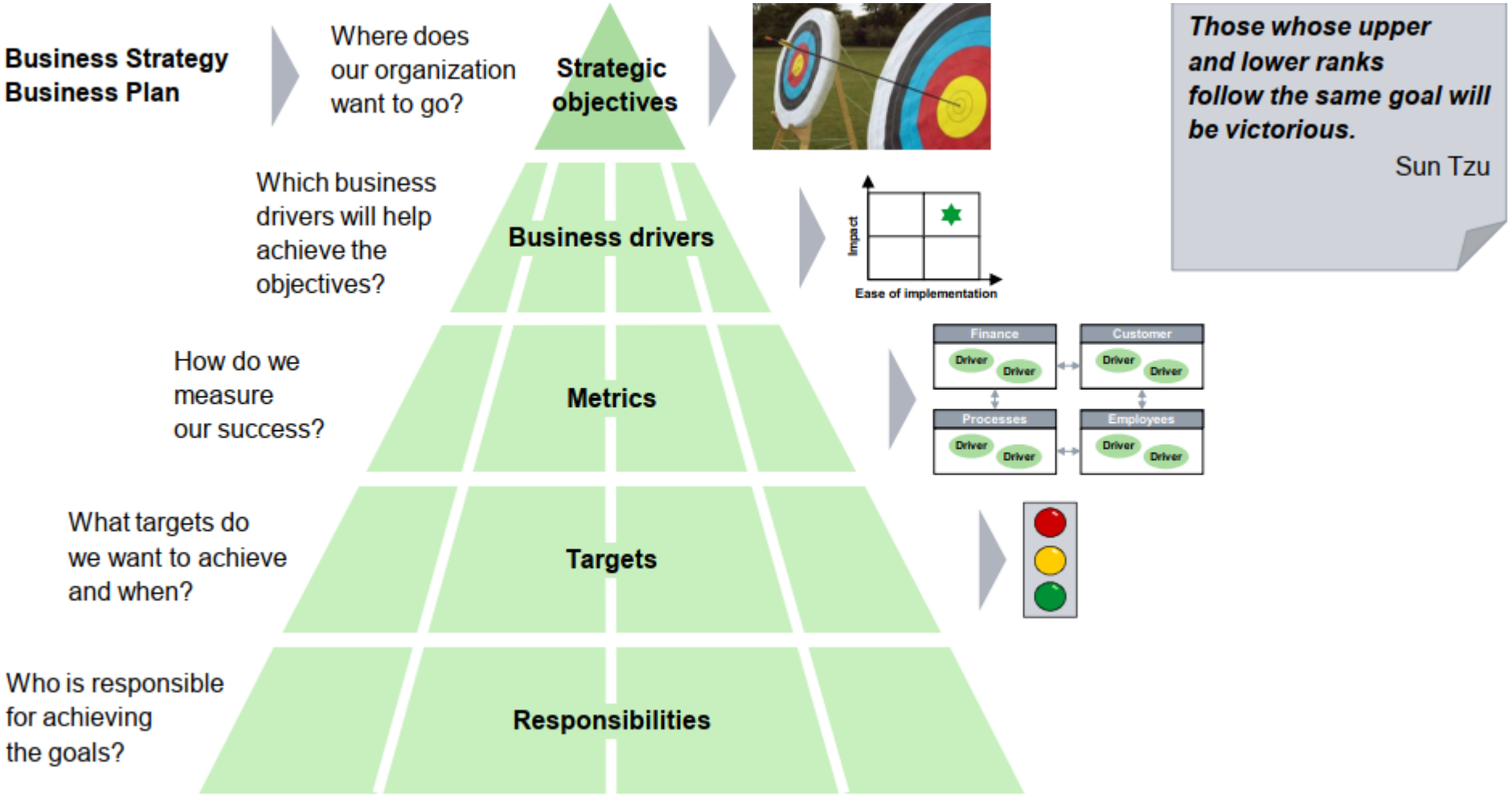
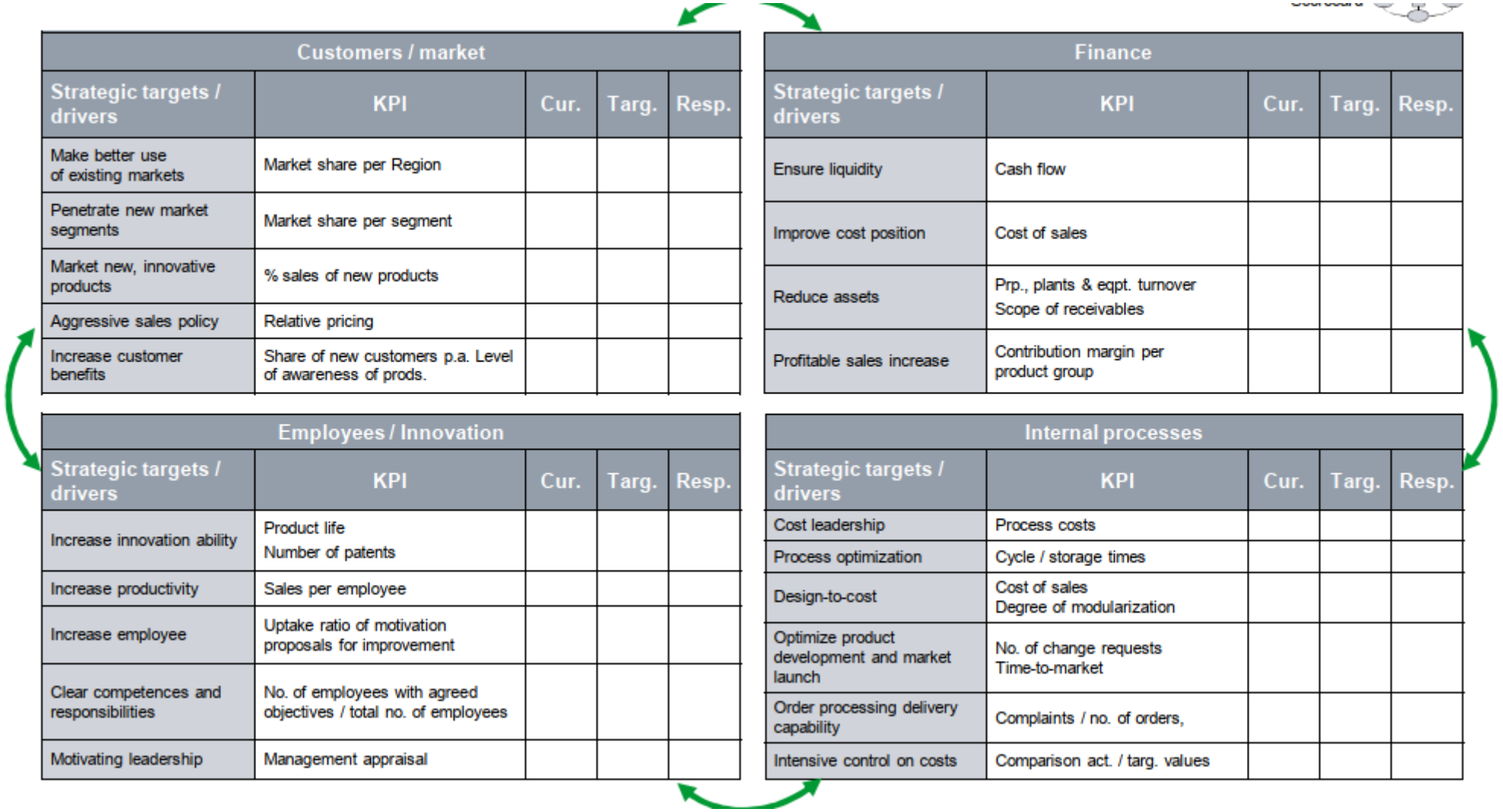
Business Field Definition 	Trends 	Competitor Benchmarking 	SWOT 	Stakeholder Mapping 	Discount / Business Value 
Strategic USP 	Market Attractiveness 	Core Competences 	Competitive Strategy 	Alignment 	SMART Targets 
Portfolio 	Market Analysis 	Innovation 	Market Strategy 	Roadmap 	Scorecard 
Performance 	Key Success Factors 	Synergies 	Resource Strategy 	Profit Calculation 	Risk Management 





Customers / market				
Strategic targets / drivers	KPI	Cur.	Targ.	Resp.
Make better use of existing markets	Market share per Region			
Penetrate new market segments	Market share per segment			
Market new, innovative products	% sales of new products			
Aggressive sales policy	Relative pricing			
Increase customer benefits	Share of new customers p.a. Level of awareness of prods.			

Finance				
Strategic targets / drivers	KPI	Cur.	Targ.	Resp.
Ensure liquidity	Cash flow			
Improve cost position	Cost of sales			
Reduce assets	Prp., plants & eqpt. turnover Scope of receivables			
Profitable sales increase	Contribution margin per product group			

Employees / Innovation				
Strategic targets / drivers	KPI	Cur.	Targ.	Resp.
Increase innovation ability	Product life Number of patents			
Increase productivity	Sales per employee			
Increase employee	Uptake ratio of motivation proposals for improvement			
Clear competences and responsibilities	No. of employees with agreed objectives / total no. of employees			
Motivating leadership	Management appraisal			

Internal processes				
Strategic targets / drivers	KPI	Cur.	Targ.	Resp.
Cost leadership	Process costs			
Process optimization	Cycle / storage times			
Design-to-cost	Cost of sales Degree of modularization			
Optimize product development and market launch	No. of change requests Time-to-market			
Order processing delivery capability	Complaints / no. of orders,			
Intensive control on costs	Comparison act. / targ. values			

1 Specific, concrete	Constitute a clear statement
2 Measurable	Can be quantified
3 Active Intervention	Say clearly what is to be done
4 Realistic	Are demanding, but achievable
5 To be done by …	Have a clear time framework

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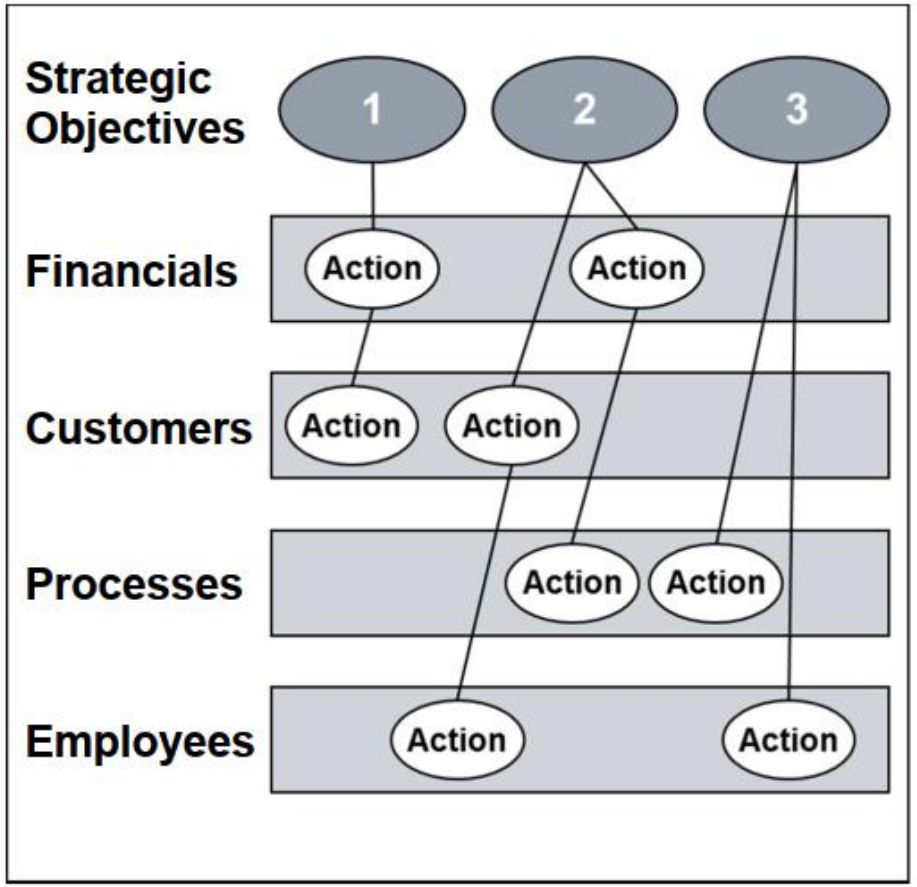
Define Action Fields | Analyze External Environment | Analyze Internal Strengths and Weaknesses | Develop Strategy | Implement Strategy | Control Strategy



Constructing the Scorecard

Firstly, find out the Strategic Objectives for the team you are in

Secondly, consider the following two questions about Actions. To drive the strategy, what are the actions that are

(a) already done?

(b) should be done?

From Strategy Map to Corporate Scorecard

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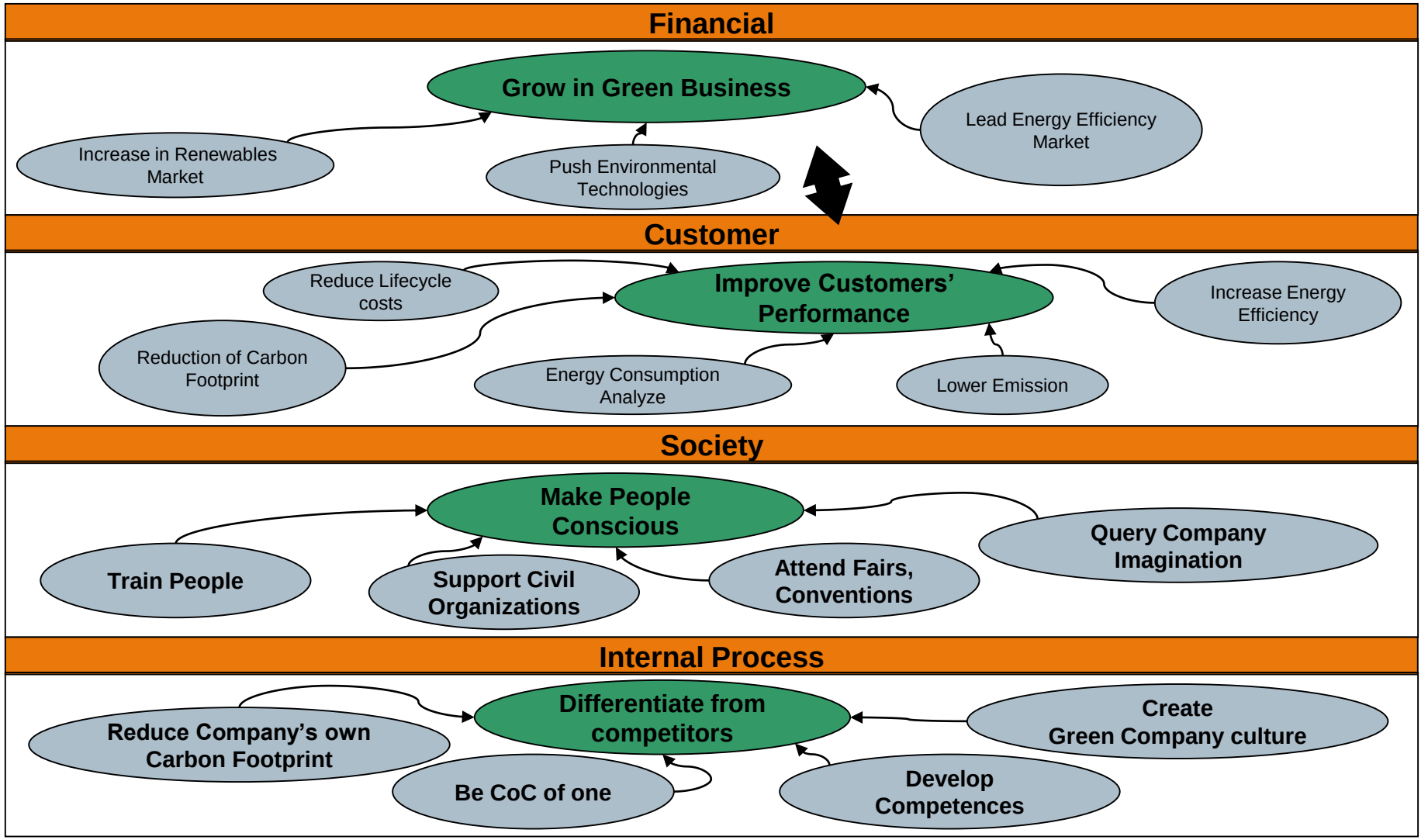

Financial Measures

	Theme	Objectives		Measures	Initiatives	Coordinator	Obstacles	Measures against it
Financial	Grow in Green Business	F1	Increase in Renewables Market	Total Orders from; - Wind Power - Solar Power - Hydro - Smart Grid Apps		Energy I&C		
		F2	Push Environmental Technologies	Total Orders from; - Water Technologies - Air Pollution Control - E-Car consempt - Traffic Solutions		Industry I&C		
		F3	Lead Energy Efficiency Market	Market Share; - Energy Efficiency - HVDC - Efficient CCPP		Industry Energy		

Customer Related Measures

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	Theme	Objectives		Measures	Initiatives	Coordinator	Obstacles	Measures against it
Customer	Improve Customers' Performance	C1	Reduction of Carbon Footprint	Reduction Ratio		Industry Energy		
		C2	Reduce Lifecycle costs	Reduction Ratio		Industry		
		C3	Energy Consumption Analiys	Volume of Business		Industry		
		C4	Lower Emission	Volume of Emission Reduction		Industry		
		C5	Increase Energy Effiency	Efficiency Ratio		Industry Energy		

Society Related Measures

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	Theme	Objectives		Measures	Initiatives	Coordinator	Obstacles	Measures against it
Society	Make People Conscious	S1	Train People	No of events		Energy		
		S2	Support Civil Organizations	No of events		Industry		
		S3	Attend Fairs, Conventions	No of events		Industry Energy I&C		
		S4	Query Company Imagination	Ratio of Good İmagination		I&C		

Internal Process Measures

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	Theme	Objectives		Measures	Initiatives	Coordinator	Obstacles	Measures against it
Internal Process	Differentiate from competitors	I1	Reduce Company's own Carbon Footprint	Reduction Ratio		Industry		
		I2	Be CoC of one	No of CoC		Industry Energy		
		I3	Create Green Company culture	Senway results No of events		Energy		
		I4	Develop Conpedences	No of experts certified		Industry		

IST Market Trends
Sales Region / Turkey

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Trend:

Country: Turkey

Representative Trends:

- *Waste to Energy*
- *Cogeneration*
- *Biomass*
- *Efficiency improvement*
- *Modernization / Replacements*

Evaluation of market potential:

Potential: 60 MW p.a.

Unit Size: 10-27 MW (biomass) 10-50 MW (cogeneration)

Total Installed capacity of completed IST projects on previous 3 years period in Turkey are listed below.

FY19: 100 MW

FY18: 65 MW

FY17: 30 MW

Market Trend Driver:

- YEKDEM (Governmental program for supporting Renewable Energy in Turkey. Program is valid between 2010-2020 and new tariff is not announced yet)
- Zero Waste Policy
- Energy Efficiency
- Electricity Price Increase
- Government policy on power generation is to use local fuels.

Special requirements:

- Local Manufacturing receives additional payment in YEKDEM
- WtE Project needs special RDF incinaration Boiler where NEM can develop technology

Proposed Sales Strategy:

- For biomass plants in range of 12MW Triveni pricing is very attractive. So we should keep providing Vadodara manufacturing STG to market.
- For Industrial projects «total cost of ownership» is important, so good price/efficiency fit should be provided.
- Financing is a key for projects to move forward. However, EXIM banks do not credit coal fired plants due to emissions. We have good option to use Siemens Leasing to finance STG scope. Keep it alive.

Preparation necessary:

- Close contact with local boiler companies
- Regular visits to EPCs
- Co-operation with SLN (Solution) unit which is recently merged to GP and DI (Digital Industries) groups.

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Bölüm:02

Pazar

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PAZAR

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The *revenue* available from all actual and potential buyers or users (customers) of your product

MARKET SIZE

Number of Buyers in the Market

X

Quantity Purchased by an Average Buyer Per Year

X

Price of an Average Unit

How to define “Market”?

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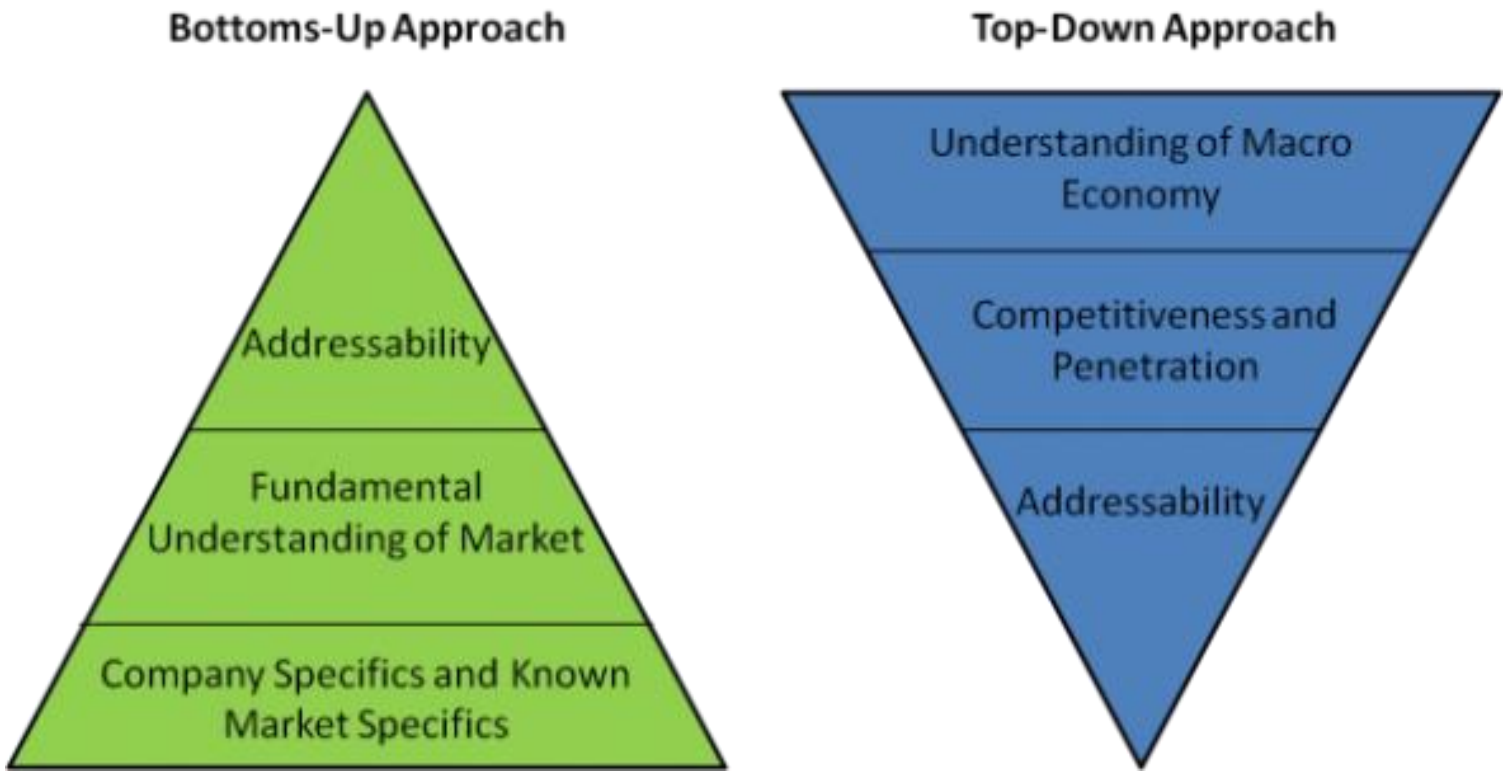
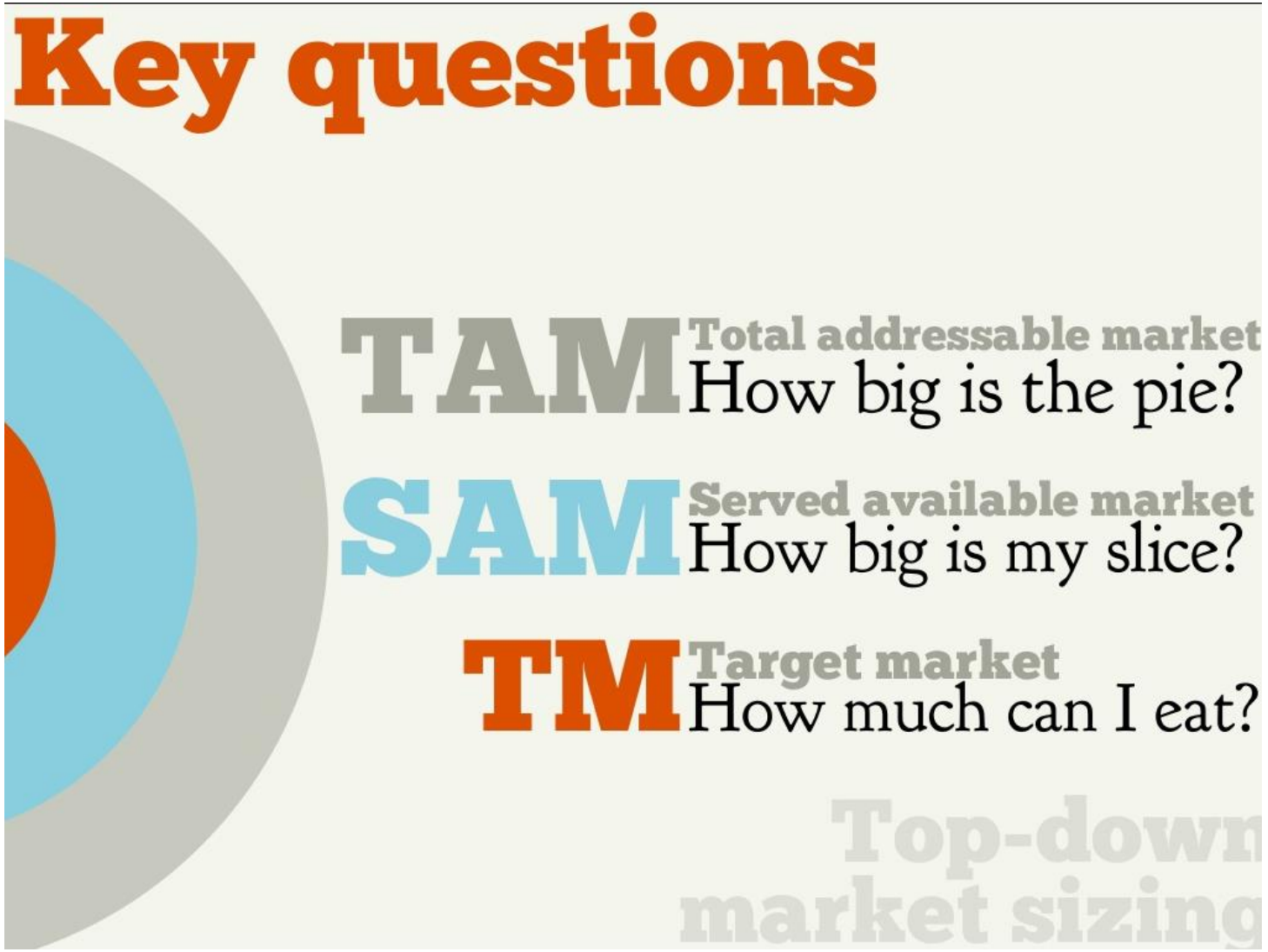


Top Down Approach

Top Down Approach



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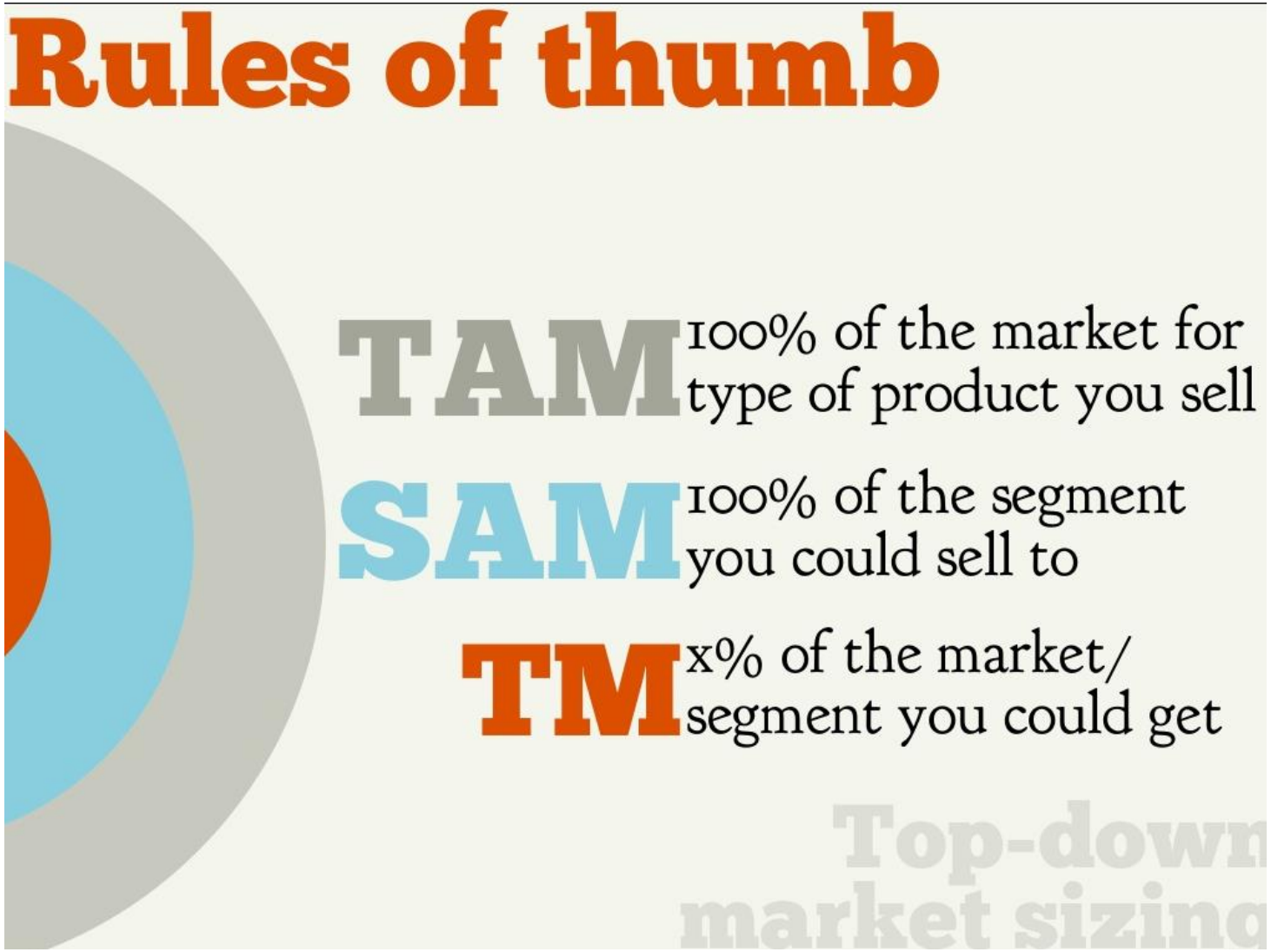

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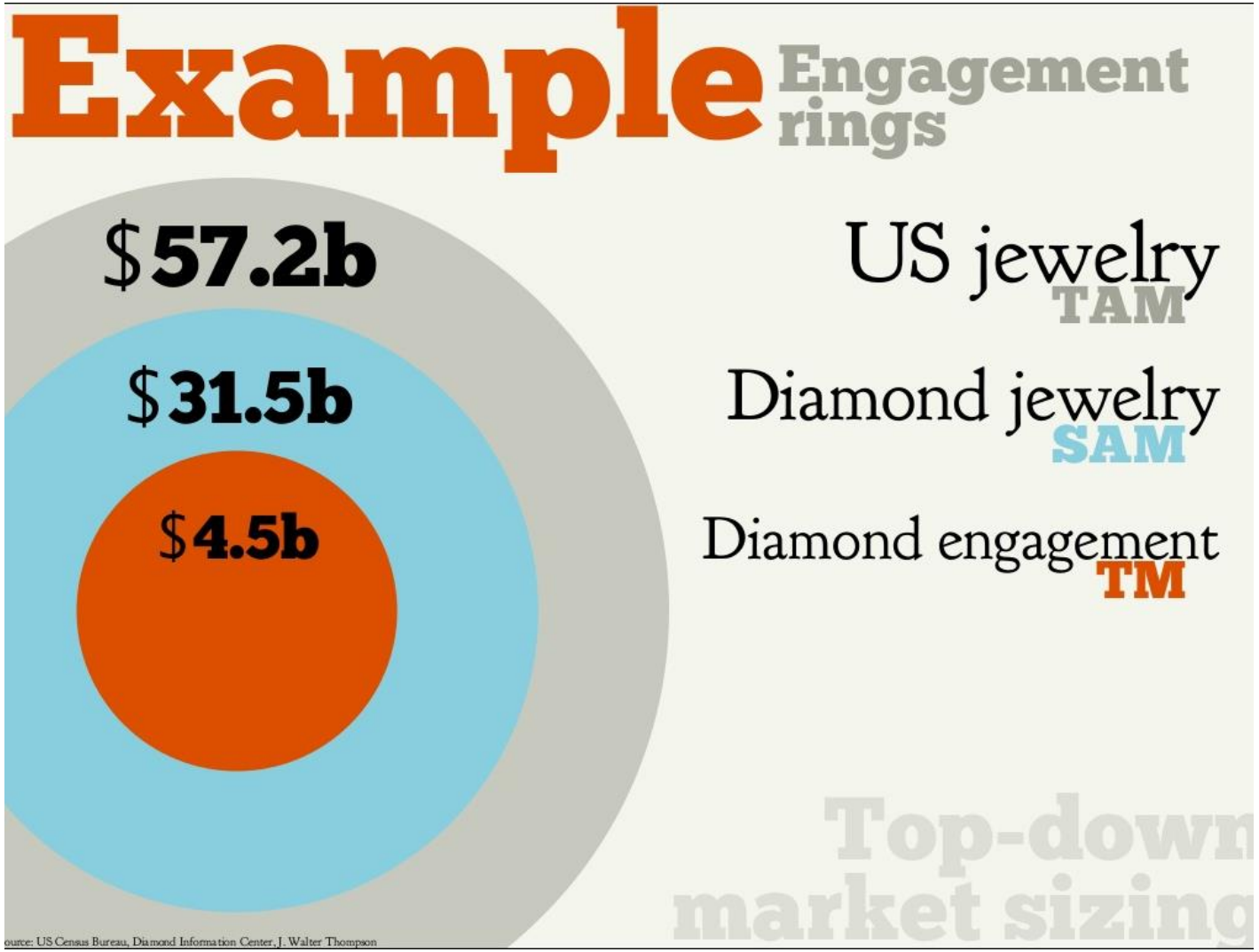
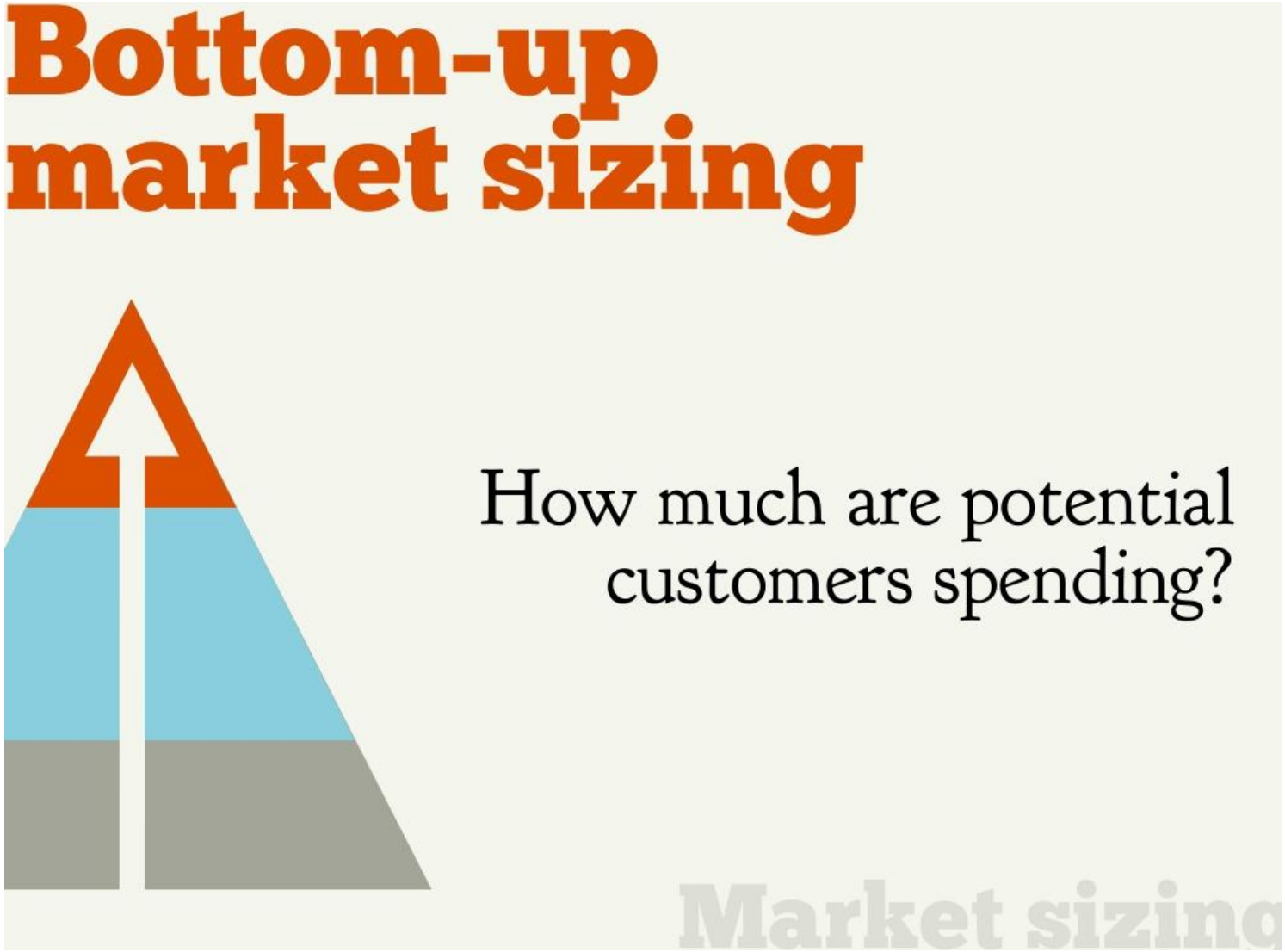


Bottom Up Approach



Bottom Up Approach

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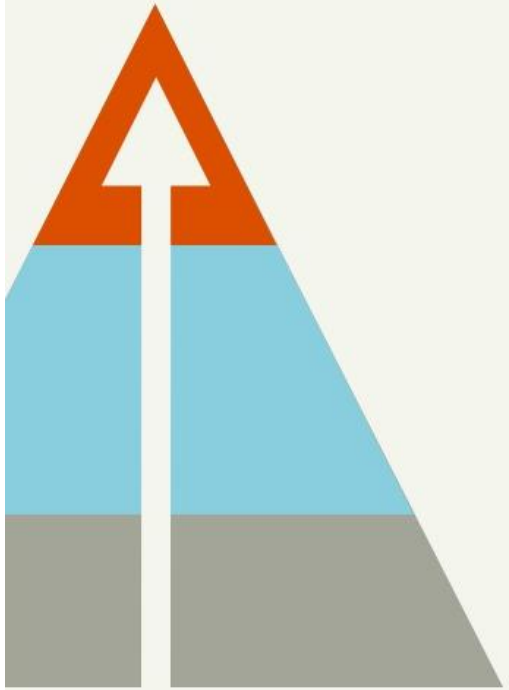
Key questions

Focus on key drivers

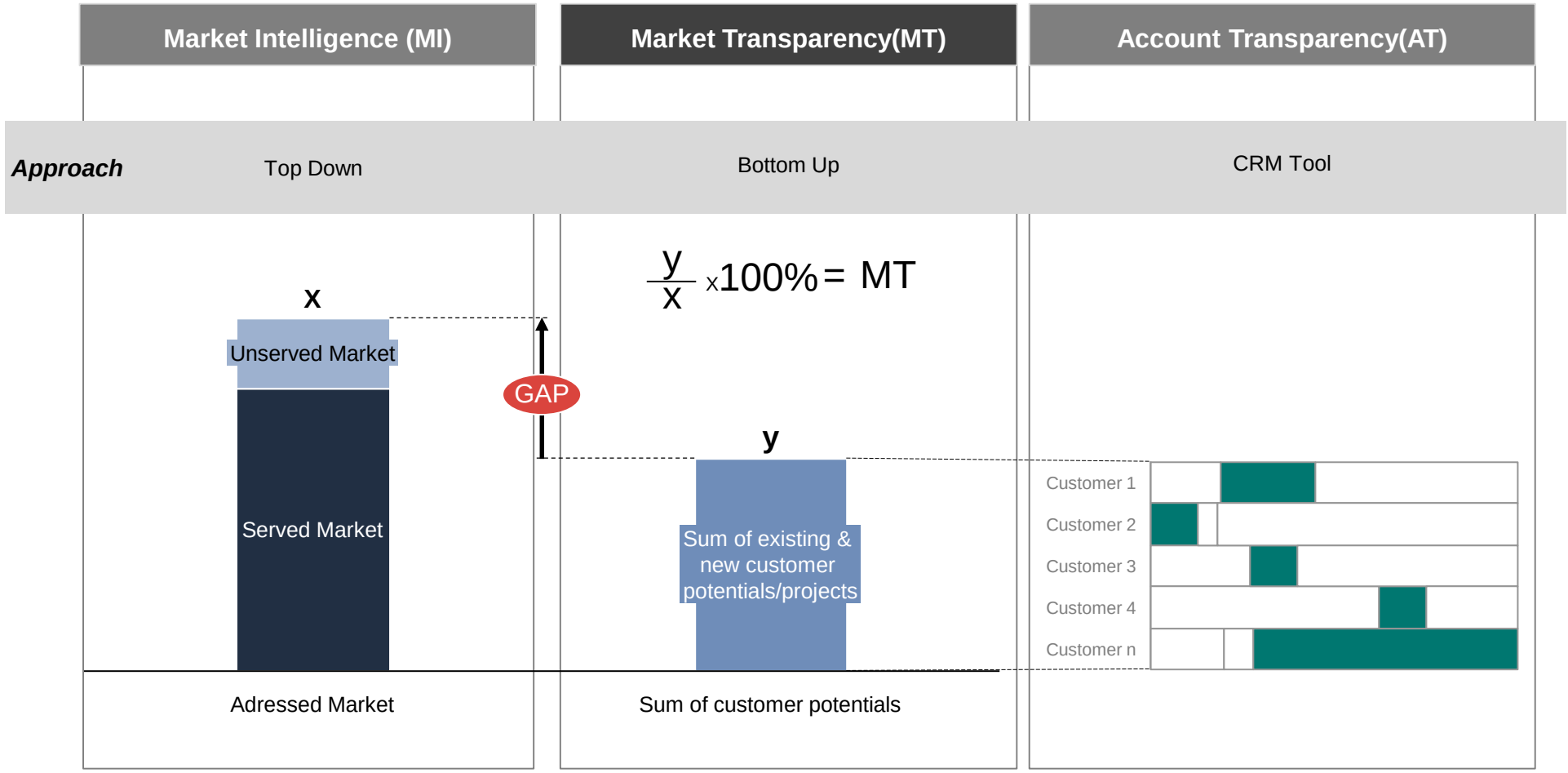


Who?
What segments?
How many?
How often?
How much?

Bottom-up market sizing

Bottom Up Approach

Market Transparency



Government targets till 2030 in Energy Sector

- 10GW Solar Power Installed Capacity
- 16 GW Wind Power Installed Capacity
- Using full potential of Hydro Power resource
- Comissioning of 1 Nuclear Power Plant
- Reducing losses in electricity generation & transmission to 15%
- Rehabiliton of Public Power Plants
- Increasing Cogen, Trigen and Microgen investments

Energy Demand Projection Indicators

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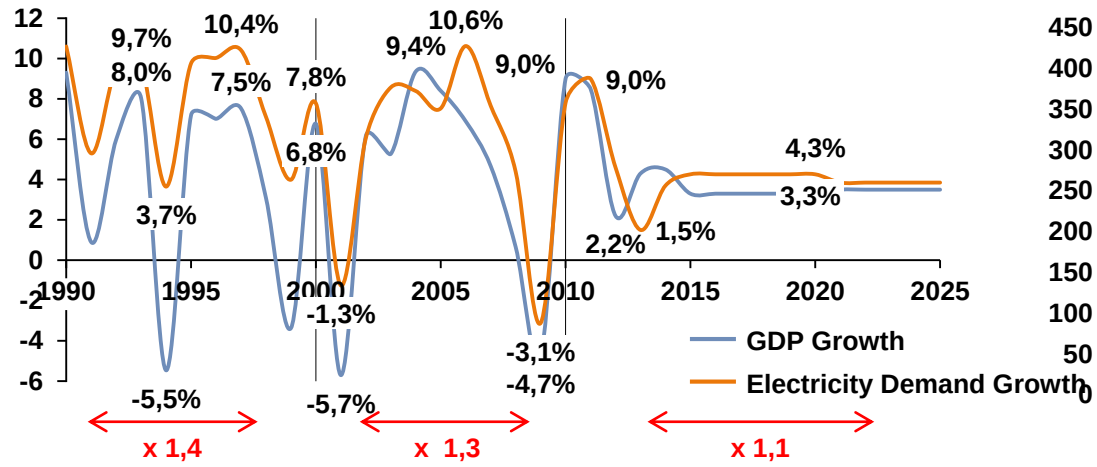
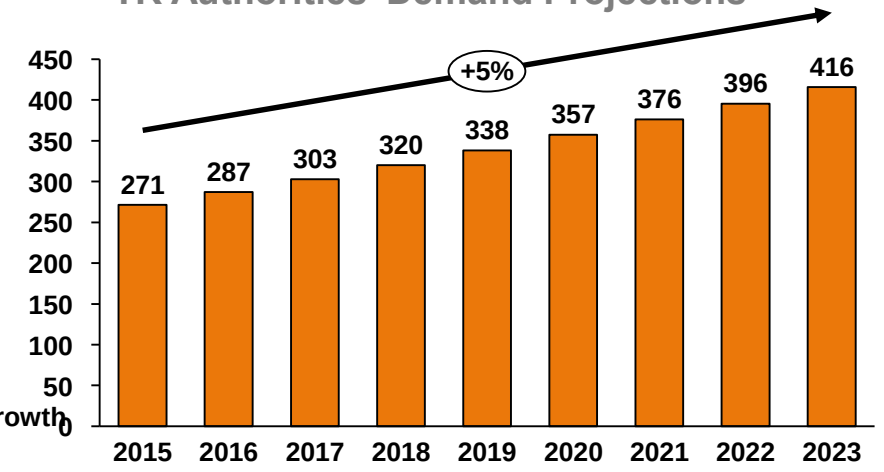
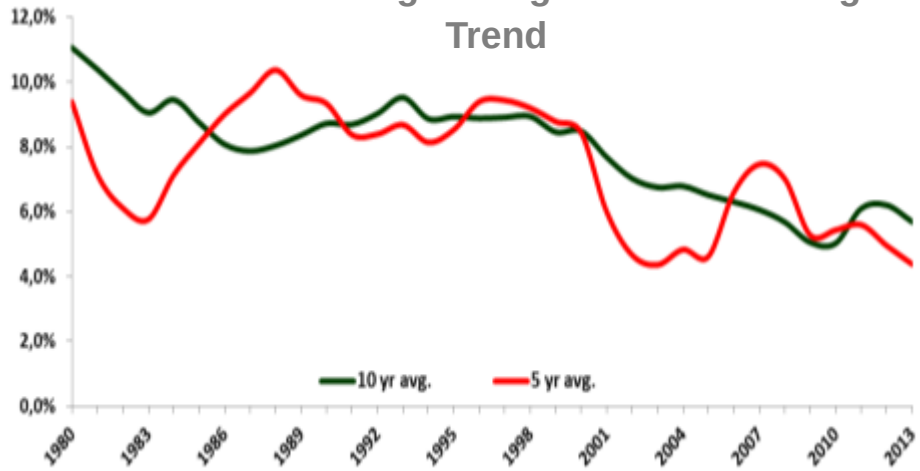
Net Electricity Consumption & GDP

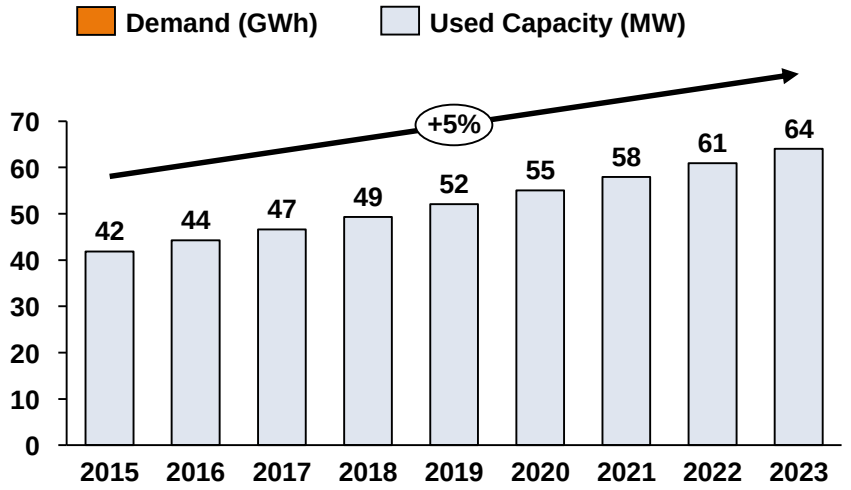


TR Authorities' Demand Projections



Demand Moving Average Has a Declining Trend





Installed Base Development Forecast

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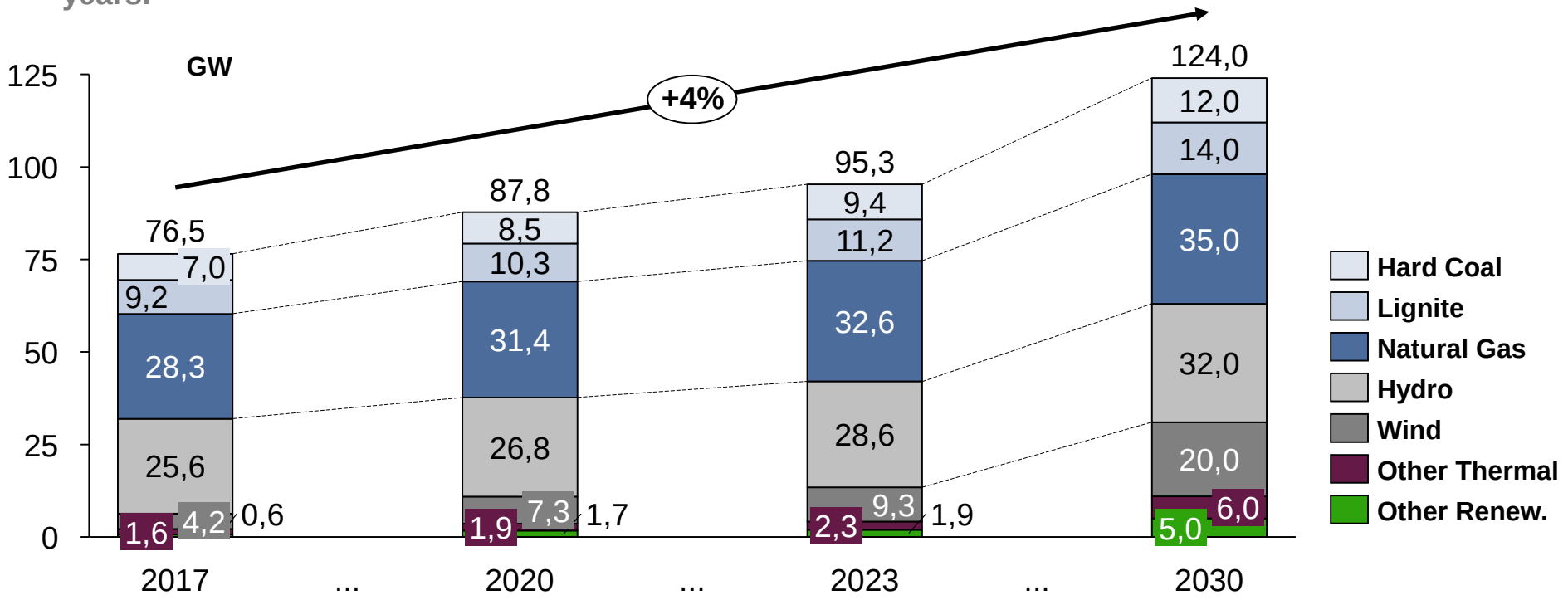
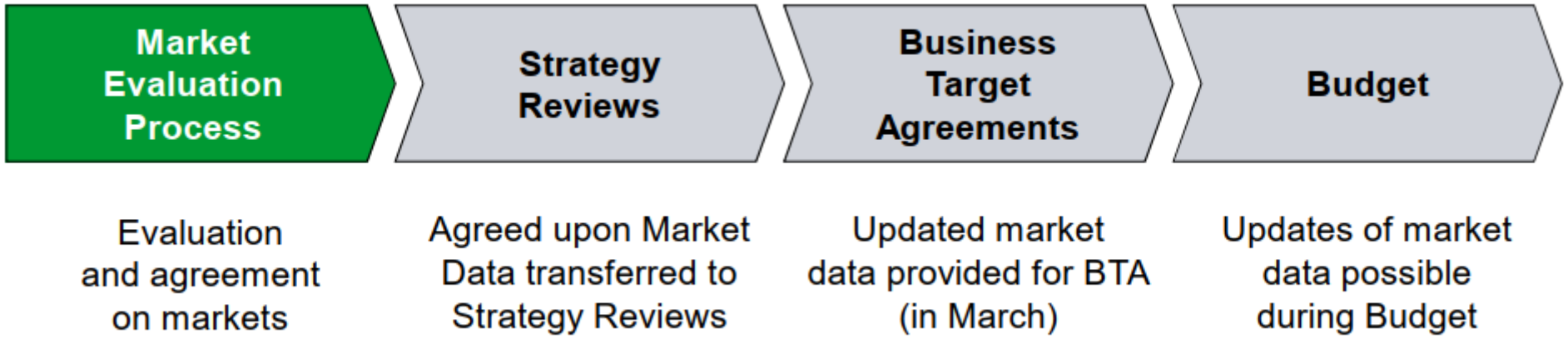
- Turkey's energy market heavily responds to changing economical conditions and it's make it hard to predict upcoming market.
- There is a large area of improvement for Turkey and energy investments will continue accordingly.
- Regarding current economical situations, Turkey's installed base is expected to reach 100 GW in 10 years.





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SEC510 - Enerji Sektöründe Mühendislik

Teşekkür ederim…

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