

Structures & Processes

HIGHER EDUCATION MANAGEMENT

Prof. Dr.-Ing. Robert Schmitt

Chair of Production Metrology and Quality Management

Laboratory for Machine Tools and Production Engineering (WZL)

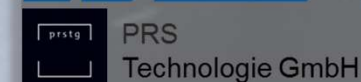
RWTH Aachen University

Vision & Mission

Excellence

Quality
Management

Accreditation



OUTLINE



RWTH Aachen, Fraunhofer IPT and PRS Technologie GmbH
Laboratory for Machine Tools and Production Engineering (WZL)

**RWTH Aachen, Fraunhofer IPT,
PRS Technologie GmbH and WZL**

*Collaboration
Cooperation*

**Chair of Production Metrology
and Quality Management**

*Structure
Segments*

**Higher Education Management
Core Topics**

*Expertise
Example Projects*

Contact Information

*Project Experts
Partners*

RWTH Aachen, Fraunhofer Society and PRS Technology GmbH

Partnerships for Public & Private Sector Collaborations



Fraunhofer

Fraunhofer Society

- Largest organization for applied science in Europe
- More than 80 Institutes and facilities in Germany and the world
- 24,000 employees
- Research budget over 2B €, thereof >1.7B € contract research
- 3 Institutes in Aachen



RWTHAACHEN
UNIVERSITY

public &
private sector
collaborations

PRS Technology GmbH

- Private sector partner of RWTH and Fraunhofer for commercial activities
- Focusses on technology and education export of German companies and research institutes into the world
- Comprehensive network and expertise abroad



RWTH Aachen University

- Formed in 1870
- Largest technical university in Germany
- Repeatedly rewarded as „University of Excellence“
- More than 42,000 students and 115 study programs
- More than 530 Professors and 9,100 Employees
- Budget > 840M €, thereof > 330M € 3rd party funding



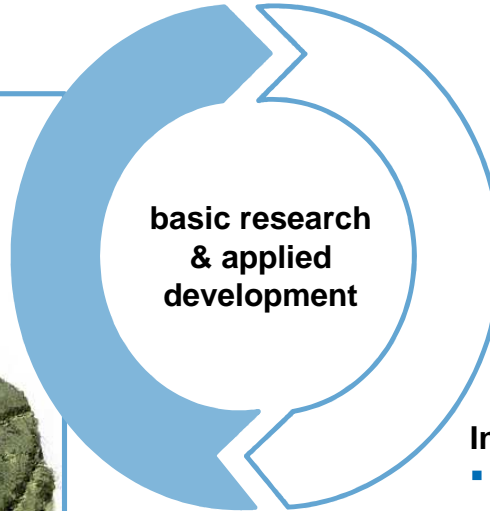
Laboratory for Machine Tools and Production Engineering (WZL)

Cooperations for Basic Research as well as Applied Development



Laboratory for Machine Tools and Production Engineering (WZL)

- Formed in 1906
- Institute of RWTH Aachen University
- Four chairs and six fields of research
- More than 800 staff members
- More than 10,600 m² laboratory and office space



Institutes and Professors (from left to right)

- Production Metrology and Quality Management (Prof. Dr.-Ing. Robert Schmitt)
- Manufacturing Technology (Prof. Dr.-Ing. Dr.-Ing. E.h. Dr. h.c. Dr. h.c. Fritz Klocke)
- Production Engineering (Prof. Dr.-Ing. Dipl.-Wirt. Ing. Günther Schuh)
- Machine Tools (Prof. Dr.-Ing. Christian Brecher)

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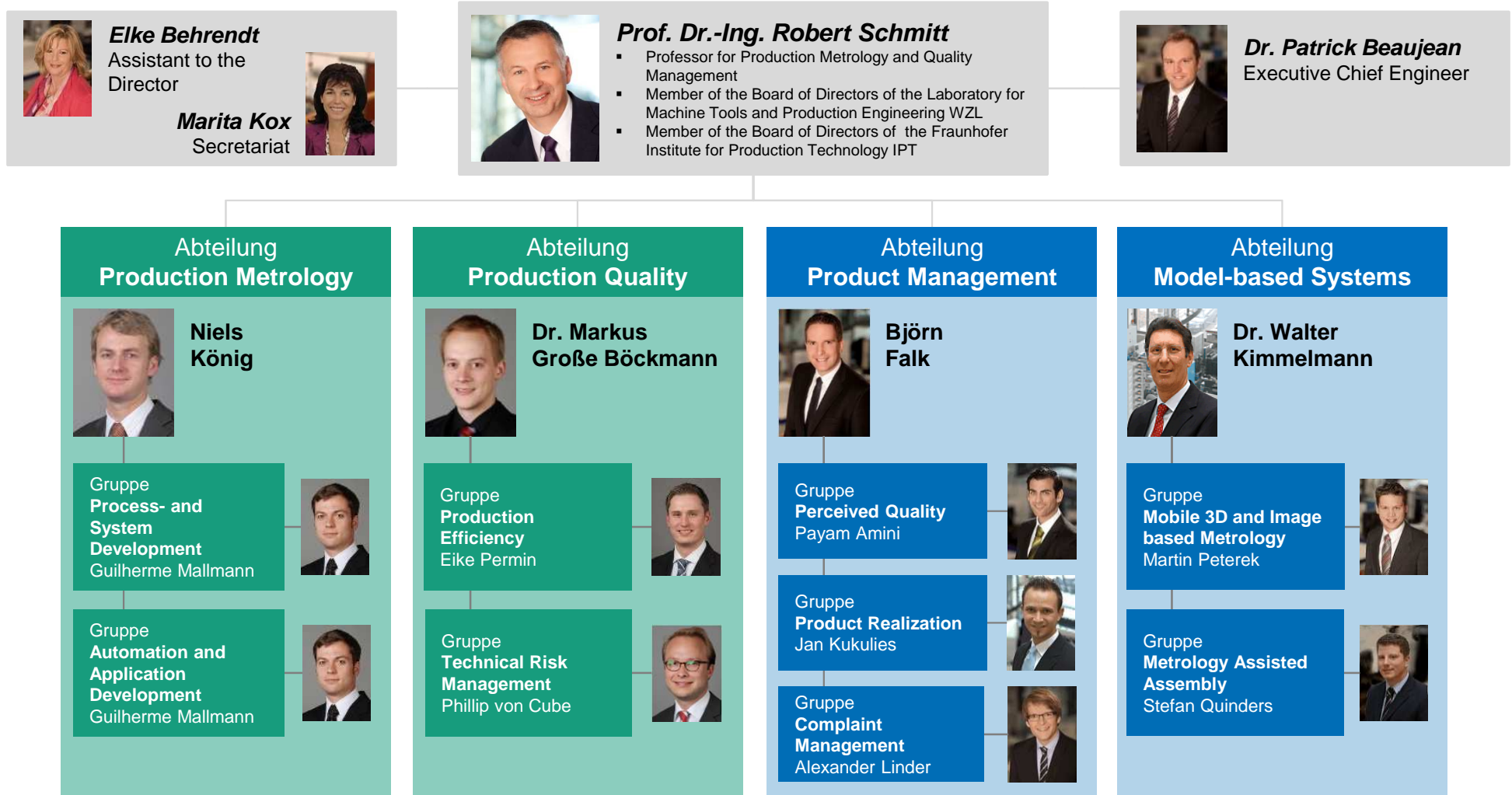
Excellence

Vision & Mission

Strategy


Production Metrology and Quality Management

Institute Structure



Production Metrology and Quality Management

Business Areas

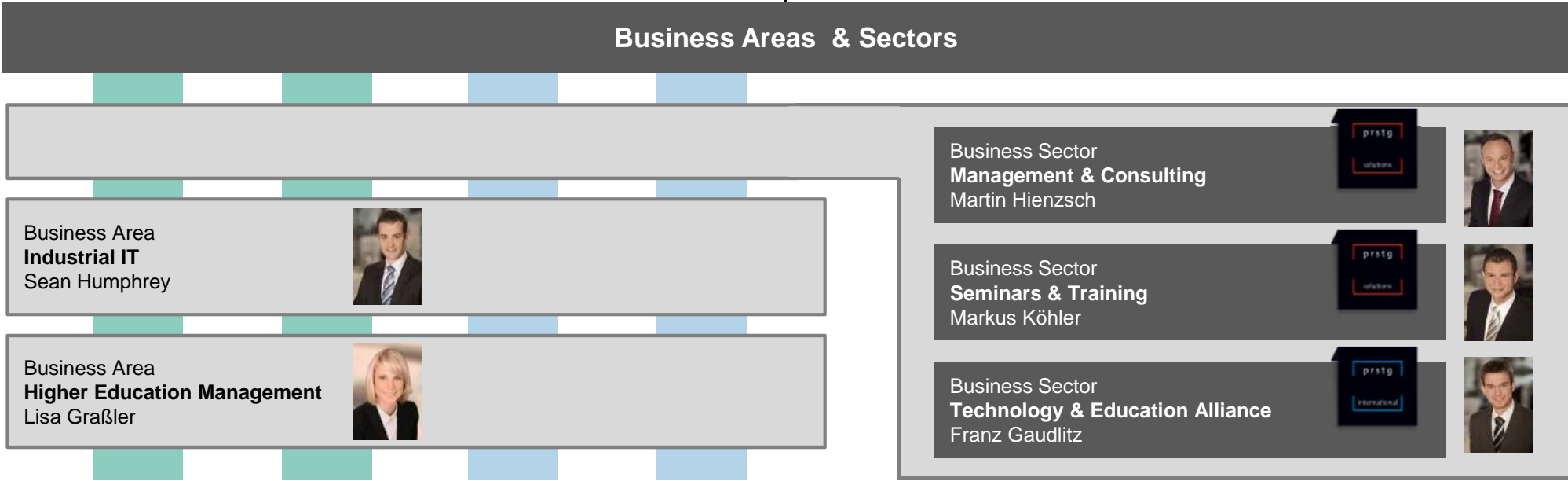


Prof. Dr.-Ing. Robert Schmitt

- Professor for Production Metrology and Quality Management
- Member of the Board of Directors of the Laboratory for Machine Tools and Production Engineering WZL
- Member of the Board of Directors of the Fraunhofer Institute for Production Technology IPT



Dr. Patrick Beaujean
Executive Chief Engineer



Higher Education Management

Coherent and Holistic Management Systems for Higher Education Institutes

MANAGEMENT SYSTEM RESEARCH

Structures



Benchmarking



Controlling



CAPACITY BUILDING

- ▶ Capacity Building in Education & Governance
- ▶ Capacity Building in Production Engineering

PRODUCTS & SERVICES

- ▶ Accreditation Preparation
- ▶ Benchmarking
- ▶ Consortia Benchmarking
- ▶ Cooperative Learning
- ▶ Course of Studies Development
- ▶ Guideline for the Implementation of Management Systems in HEI
- ▶ EFQM for HEI
- ▶ Motivated Quality Management
- ▶ Professional Diploma

ADVISORY & IMPLEMENTATION ASSISTANCE

- ▶ Market Analysis & Feasibility Studies
- ▶ Governance
- ▶ QMS Implementation
- ▶ Self-Assessments
- ▶ Higher Education Benchmarking

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Higher Education Management

Management System Research

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Higher Education Management

Research focusing Management Systems

Research focus

Coherent and Holistic Management Systems for Higher Education Institutions

Competence Areas

Structures

„Management tools for flexible, controlled and sustainable internal changes and external influences“

Benchmarking

„Innovative approaches and concepts for assessing organizational performance and standard strategies to improve performance“

Controlling

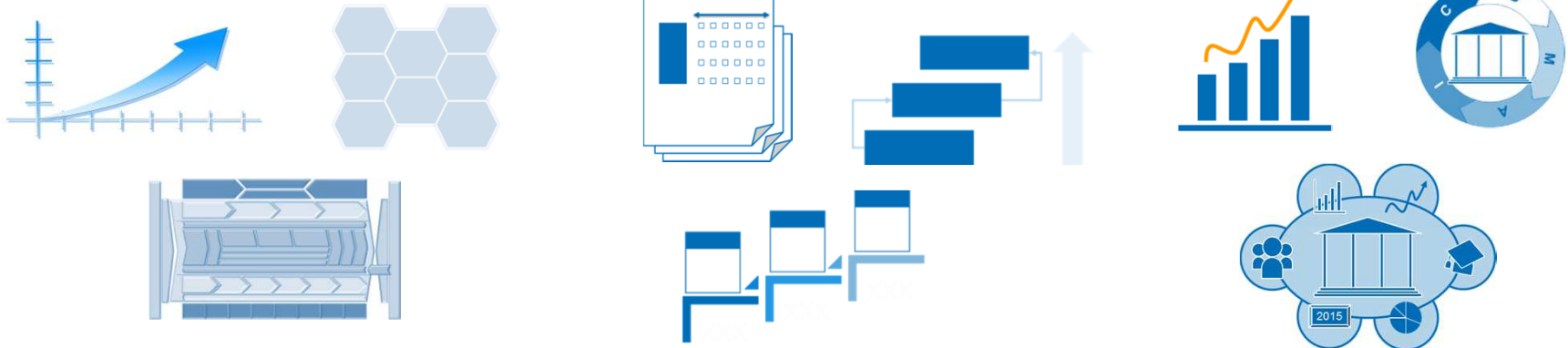
„Extensive approaches for implementing performance measurement systems to ensure efficient control of resources“

Sub-Topics

- Robust Organizational Structures
- Definition and Characteristics of Management Fields
- Process Maps for Learning, Research and Administration

- Objective Performance Assessment
- Assessment of Organizational Maturity based on Criteria and Levels of Maturity
- Concepts for the Progressive Increase in Strategic Performance

- Indicators and Indicator Types
- Performance Measurement Systems
- Six Sigma and Performance of Improvement Projects



Higher Education Management

Capacity Building

MANAGEMENT SYSTEM RESEARCH

Structures



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Higher Education Management

Capacity Building in Education & Governance (Overview)



	Year 1				Year 2				Year 3			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Course	■			◆	■			◆	■			◆
Project	Project Presentation				Project Presentation				Project Presentation			
Guidance via Skype	◆	◆	◆		◆	◆	◆		◆	◆	◆	
E-Learning	E-Learning				E-Learning				E-Learning			
Job Shadowing	Job Shadowing				Job Shadowing				Job Shadowing			
Consulting	Consulting				Consulting				Consulting			

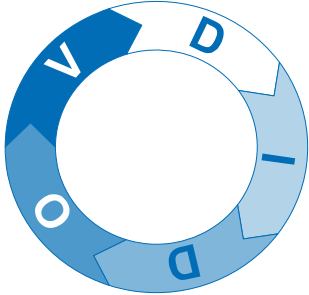
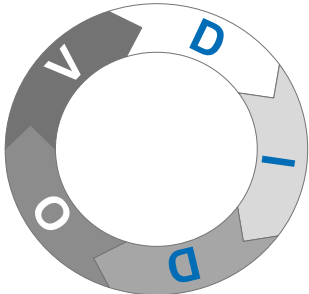
Higher Education Management

Capacity Building in Education & Governance (Topics)

	Level 1	Level 2	Level 3
Governance & Quality Management	<ul style="list-style-type: none"> ▶ Introduction to Quality Management ▶ Quality Management Systems ▶ Process Modeling ▶ Process Landscape ▶ KPI 	<ul style="list-style-type: none"> ▶ Quality Control Loops ▶ Organizational Structure ▶ Big Picture ▶ Porters Five Forces ▶ Process Optimization ▶ Value Stream Mapping 	<ul style="list-style-type: none"> ▶ Market Analysis ▶ Benchmarking ▶ Resource Allocation (Budgeting) ▶ Motivation ▶ Incentivization
Strategy & Identity	<ul style="list-style-type: none"> ▶ Vision/Mission/Values ▶ Strategy/Road-mapping ▶ Objectives 	<ul style="list-style-type: none"> ▶ Brand Identity ▶ Differentiation/Profile Building 	<ul style="list-style-type: none"> ▶ Marketing ▶ Internationalization/Mobility
Research & Education	<ul style="list-style-type: none"> ▶ Creation of Study Programs ▶ Study & Module Design 	<ul style="list-style-type: none"> ▶ PhD Structures ▶ Research Structures ▶ Learning and Teaching Methods ▶ Blended Learning/E-Learning ▶ Evaluation ▶ Self Assessments 	<ul style="list-style-type: none"> ▶ Study Program Portfolio ▶ Collaboration with Industries/Fund Raising ▶ Distance Learning/Life Long Learning ▶ Accreditation & Certification
Change & Project Management	<ul style="list-style-type: none"> ▶ Project Management 	<ul style="list-style-type: none"> ▶ Improvement Projects ▶ Team Building ▶ Team Organization ▶ Roles 	<ul style="list-style-type: none"> ▶ Change Projects ▶ Layers of Communication/Intercultural Communication ▶ MBTI ▶ Leadership

Higher Education Management

Capacity Building in Production Engineering (Overview)

<h3>Six Sigma – Qualification</h3> <div style="text-align: center;"> <div style="border: 1px solid blue; padding: 5px; margin-bottom: 10px;"> Green Belt 6 Days E </div> <div style="font-size: 2em; color: blue; margin: 0 auto;">↑</div> <div style="border: 1px solid blue; padding: 5px; margin-bottom: 10px;"> Yellow Belt 3 Days E </div> <div style="font-size: 2em; color: blue; margin: 0 auto;">↑</div> <div style="border: 1px solid blue; padding: 5px;"> White Belt 1 Day E </div> </div>	<h3>Design for Six Sigma</h3>  <h3>Six Sigma for Problem Solving</h3> 	<h3>Expert Trainings – “One dayers”</h3> <table border="0"> <tr> <td style="border: 1px solid blue; padding: 5px; margin-bottom: 5px;"> Requirements Mgmt. 1 Day E </td> <td style="border: 1px solid blue; padding: 5px; margin-bottom: 5px;"> Inspection Planning 1 Day E </td> </tr> <tr> <td style="border: 1px solid blue; padding: 5px; margin-bottom: 5px;"> Perceived Quality 1 Day E </td> <td style="border: 1px solid blue; padding: 5px; margin-bottom: 5px;"> Introduction to Statistics 1 Day E </td> </tr> <tr> <td style="border: 1px solid blue; padding: 5px; margin-bottom: 5px;"> DoE 1 E </td> <td style="border: 1px solid blue; padding: 5px; margin-bottom: 5px;"> Product Value Analysis 1 Day E </td> </tr> <tr> <td style="border: 1px solid blue; padding: 5px; margin-bottom: 5px;"> FMEA 1 Day E </td> <td style="border: 1px solid blue; padding: 5px; margin-bottom: 5px;"> QFD 1 Day E </td> </tr> <tr> <td style="border: 1px solid blue; padding: 5px; margin-bottom: 5px;"> Efficient Engineering 1 Day E </td> <td style="border: 1px solid blue; padding: 5px; margin-bottom: 5px;"> Big Data 1 Day E </td> </tr> <tr> <td style="border: 1px solid blue; padding: 5px; margin-bottom: 5px;"> SPC 1 Day E </td> <td style="border: 1px solid blue; padding: 5px; margin-bottom: 5px;"> Project Management 1 Day E </td> </tr> </table>	Requirements Mgmt. 1 Day E	Inspection Planning 1 Day E	Perceived Quality 1 Day E	Introduction to Statistics 1 Day E	DoE 1 E	Product Value Analysis 1 Day E	FMEA 1 Day E	QFD 1 Day E	Efficient Engineering 1 Day E	Big Data 1 Day E	SPC 1 Day E	Project Management 1 Day E
Requirements Mgmt. 1 Day E	Inspection Planning 1 Day E													
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<p>FMEA Failure Mode and Effects Analysis QFD Quality Function Deployment SPC Statistical Process Control DoE Design of Experiments</p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> Seminar for Companies </div> <div style="text-align: center;"> <div style="border: 1px solid blue; padding: 2px 5px; display: inline-block;">E</div> Seminars in English </div> </div>													

Higher Education Management

Advisory and Implementation Assistance

MANAGEMENT SYSTEM RESEARCH

Structures



Benchmarking



Controlling



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ADVISORY & IMPLEMENTATION ASSISTANCE

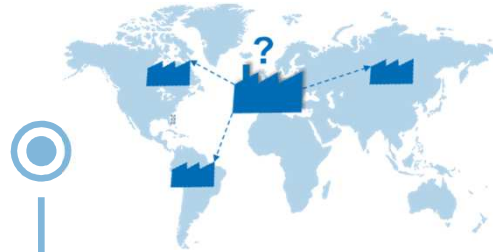
- ▶ Market Analysis & Feasibility Studies
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Higher Education Management

Advisory and Implementation Assistance for Management Systems

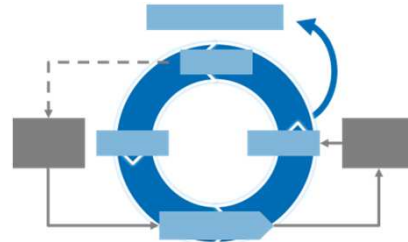
MARKET ANALYSIS & FEASIBILITY STUDIES

Support of HEI in the conduction and evaluation of specific market analysis and feasibility studies



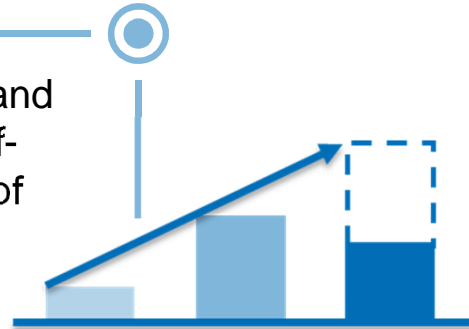
QMS IMPLEMENTATION

Advisory and Assistance for HEI in design and implementation of individual QMS



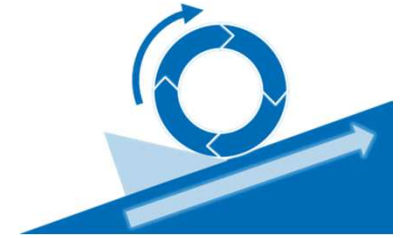
SELF-ASSESSMENT

Assistance of HEI in introduction and operative implementation of Self-Assessments and identification of improvement measures



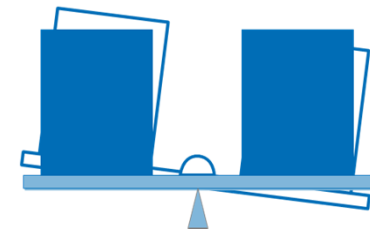
GOVERNANCE

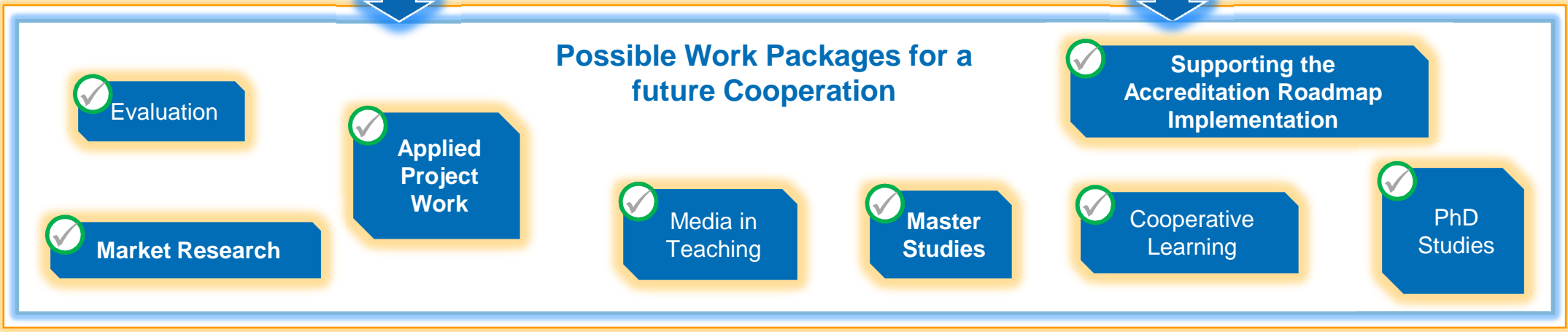
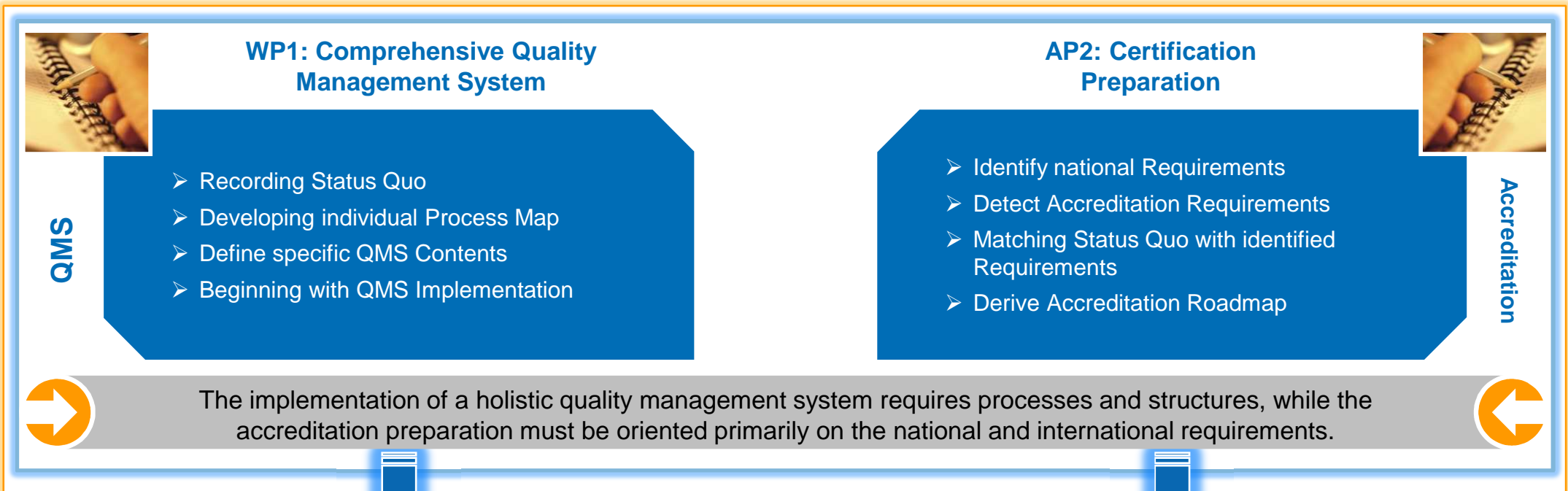
Support of HEI through targeted use of methods on their way to Governing Excellence



HIGHER EDUCATION BENCHMARKING

Advisory on finding cooperating partners and establishing appropriate structures for the conduction of external benchmarks





Higher Education Management

QMS Implementation (Objectives, Benefits and Framework)

EXAMPLE

Important Objectives for Higher Education Institutes

- Establishment of comprehensive Quality Mgmt. System
- Establishment of Structures and Control System
- Establishment of Accreditation Roadmap

Essential Benefits for Higher Education Institutes

- Structured Task Packages for Accreditation Preparation
- Enabling of a market-orientated Education for the Students
- Sustainable Growth through Structures
- Manageable System

Framework Conditions for Higher Education Institutes

- Top Management Support for Project Objectives
- Continuous Project Awareness / On-Site Marketing
- Continuous Project Team On-Site

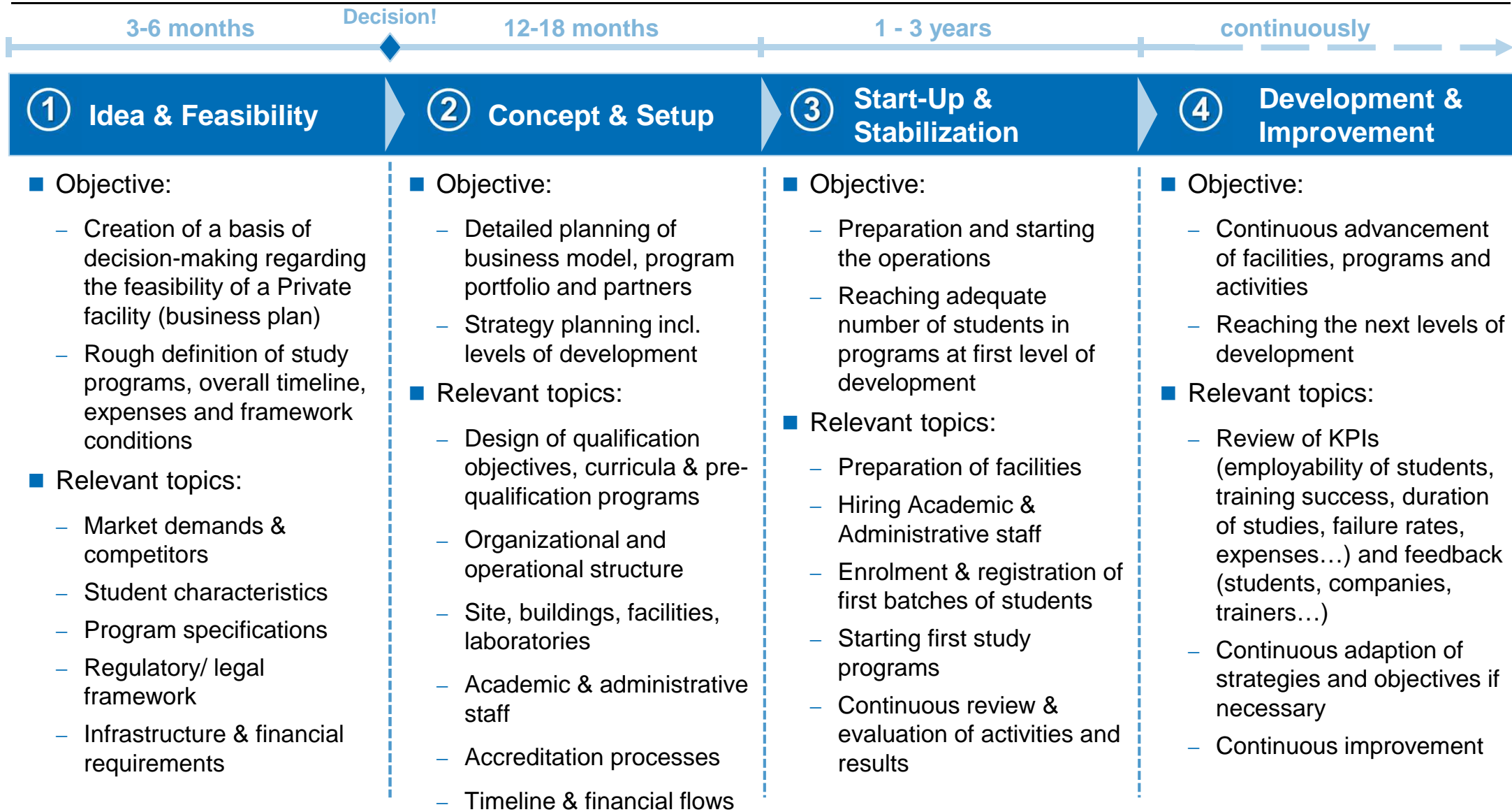


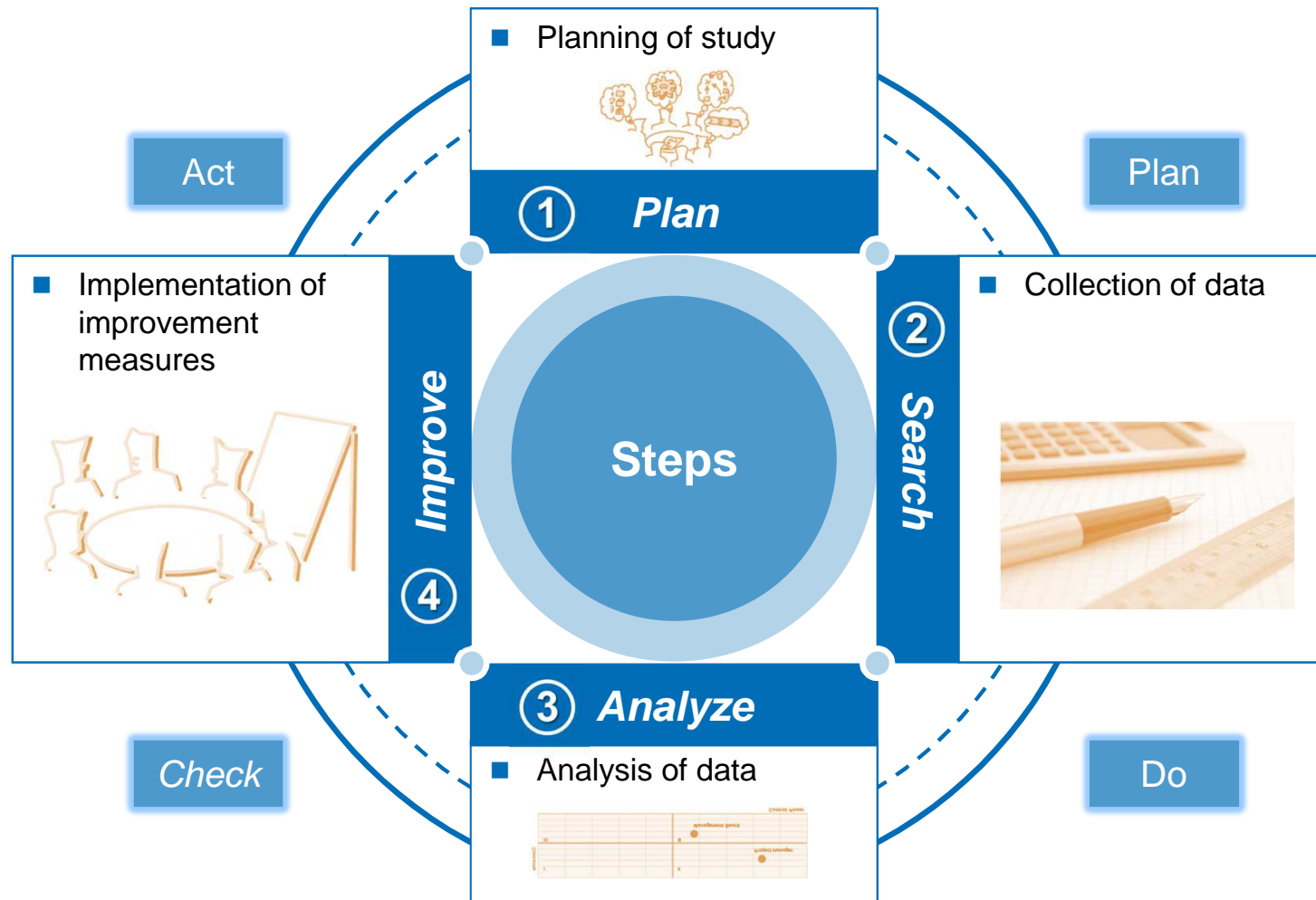
The implementation of a holistic QMS requires an appropriate framework. A proper definition of objectives and a shared understanding of the stakeholders are essential.

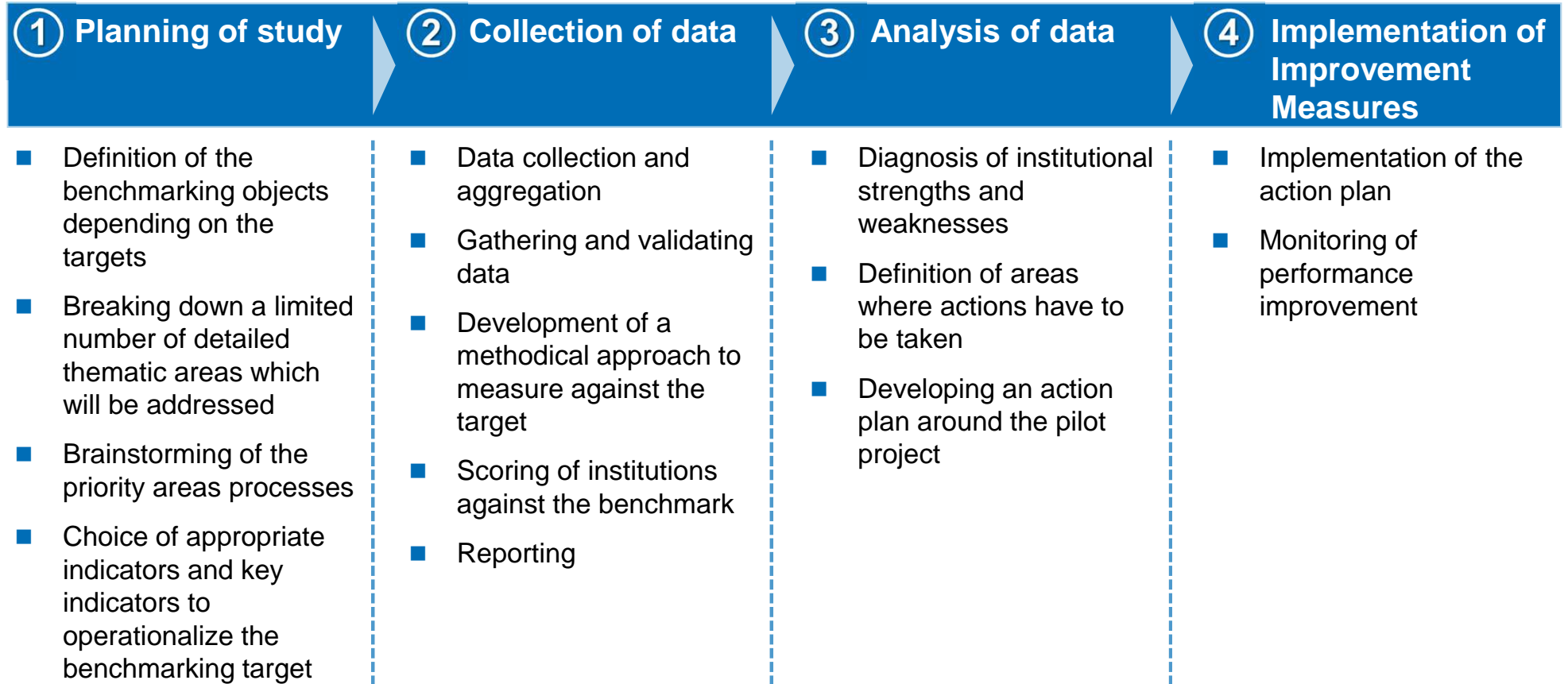


Higher Education Management

Market Analysis and Feasibility Studies







In the long-term a knowledge data base for excellence in HEI will be created.

Higher Education Management

Products and Services

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ADVISORY & IMPLEMENTATION ASSISTANCE

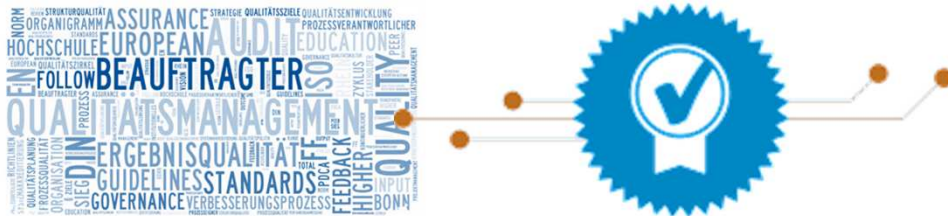
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Higher Education Management

Products and Services for Management Systems

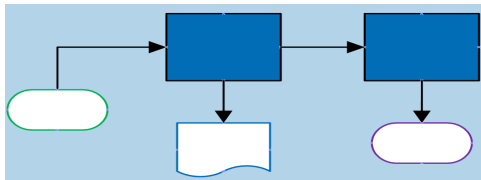
ACCREDITATION PREPARATION

Practiced Quality Management – The basis of quality-oriented teaching



COOPERATIVE LEARNING

Guidelines for standardized processes – E.g. implementation of Case Study into lecture unit based on specific didactic approach



BENCHMARKING

Competitive Analysis – Positioning the own university in comparison to other universities



CONSORTIA BENCHMARKING

Learning from the best – Getting to know successful case studies on selected topics



AND MANY MORE ...

- ▶ Course of Studies Development
- ▶ Guideline for the Implementation of Management Systems in HEI
- ▶ EFQM for HEI
- ▶ Motivated Quality Management
- ▶ Professional Diploma
- ▶ Et cetera

Preparation and Support for System Accreditation

Challenges

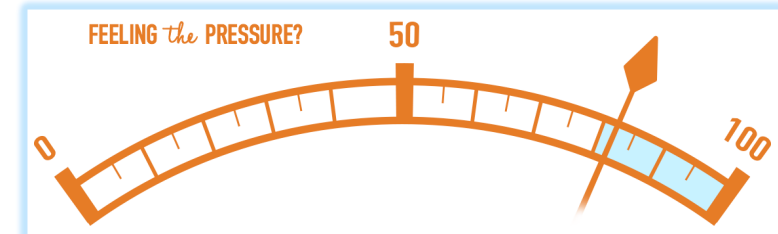
- ▶ Insufficient expertise in process descriptions, target systems and Quality Management Systems
- ▶ Missing traceability and performance tests of quality-related issues and activities
- ▶ Lack of capacity for implementation and monitoring of the university-wide roll-outs

Approach

- ▶ Building a organization-wide agreed target system by means of a steering committee
- ▶ Definition and coordination of control loops, tasks/competencies/responsibilities and processes
- ▶ Implementation of pilot and roll-out

Benefits

- ▶ Planning security during preparation for system accreditation
- ▶ Consideration of the legal and normative requirements and requirements of all stakeholders
- ▶ Appropriate tool to support and control continuous improvement process



Competitive analysis - positioning of the own organization in comparison to others

Challenges

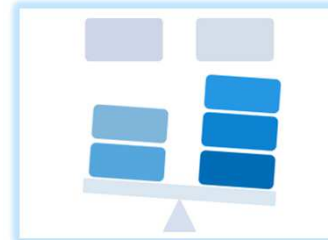
- ▶ Lack of opportunities for a detailed comparison with other Higher Education Institutions
- ▶ No recourse to an universal knowledge base for efficient university management
- ▶ Insufficient approaches to assess the own organizational maturity in terms of increasing internal & external requirements

Approach

- ▶ Formation of a consortium of experts, senior experts and information carriers and identification of relevant fields of activity in defined thematic areas for the governance of universities
- ▶ Benchmarks based on a standardized questionnaire and semi-structured interviews with experts
- ▶ Comparison and analysis of different approaches and derivation of best practices and success factors

Benefits

- ▶ Reliance on extensive expertise and many years of experience in benchmarking projects
- ▶ Identification of need for further trainings in the examined thematic areas
- ▶ Derivation of strategic recommendations



RWTH AACHEN UNIVERSITY



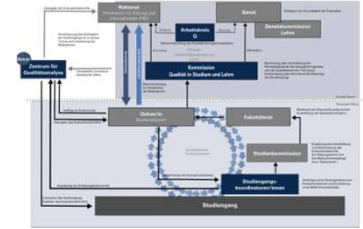
Projects

- ▶ Development of Quality Management System for Teaching and Learning
- ▶ Preparation for System Accreditation



Implementation of database and development of custom oriented reports for management reviews

DATABASES AND REPORTS

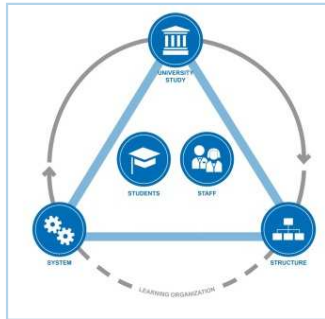


Adjusted control loops at study program, faculty and university level incl. external reviewers

CONTROL LOOPS

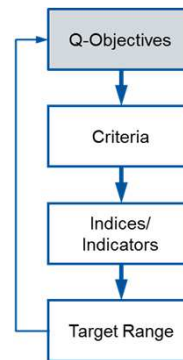
QUALITY OBJECTIVES

Set of University wide quality objectives for teaching and learning



KPIS AND INDICATORS

Key performance indicators to gather status quo



ACCREDITATION

Preparation and accompaniment for accreditation process



Higher Education Management

German University in Oman – Start-Up & Continuation

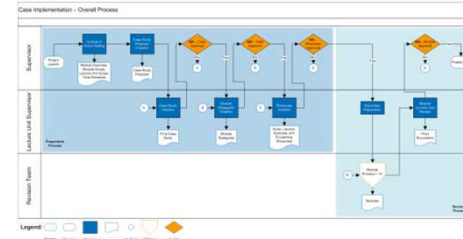
EXAMPLE

GUTECH IN OMAN

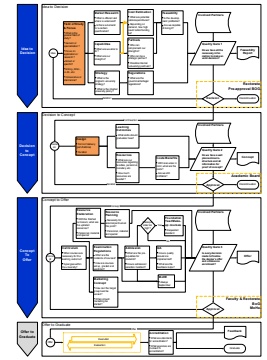


Projects

- ▶ Development of Management System
- ▶ Conduction of Market Research Studies
- ▶ Development of Study Programs
- ▶ International Workshops



Standardized guideline for Case Study based learning

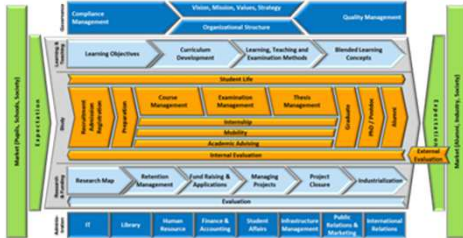


Guideline for development of study programs

TEACHING AND LEARNING METHODS

MANAGEMENT SYSTEMS

Development and implementation of management system and process landscape on Q.Wiki basis



MARKET RESEARCH

Market research for new master programs, to develop portfolio and reach market demands



PHD PROGRAM

Development of PhD Modell



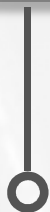
Project sponsored by **DAAD**



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Excellence

Vision & Mission

Strategy

CONTACT INFORMATION



We look forward to hearing from you in order to develop ideas with you or to answer any questions.



Dr.-Ing. Dipl.-Wirt. Ing.
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Executive Chief Engineer
Six Sigma Black Belt

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Six Sigma Black Belt

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✉ L.Grassler@wzl.rwth-aachen.de
www.education-qm.de

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Dipl.-Ing.
Stephan Losse
Research Associate
Six Sigma Black Belt

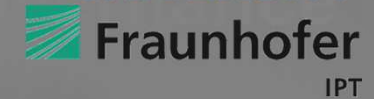
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