METOP GmbH

MENSCH – TECHNIK – ORGANISATION – PLANUNG
An-Institut der Otto-von-Guericke-Universität Magdeburg

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Life Cycle Management of Large Scale International IT-Systems
Content to be covered

How to lead and manage

- Objectives
- Business Design
- Development
- Implementation
- Operation
- Phase down

of global complex IT-Systems in International Companies
What are the basic Characteristics of Large IT Projects?

What are the basic business characteristics impacting IT-Projects?

Selected Key topics of IT - Projects

What is essential to understand the role of IT?

Managing the Challenges
What is it all about …..

Focus:
How to enable a sustainable fit between business needs and the underlying needed IT-systems in order to run the business smoothly while managing IT – systems

Reason why:
Business needs and IT-systems needs are not in synch

Need for action:
Active management to bridge the gaps is needed to enable a sustainable fit
What are the basic Characteristics of Large IT Projects?
What programs make challenging...

- Δ strategic intent Business vs. SAP standard functionality
  - Verdi
  - SDP 1 + SDP 2

- Development strategy
  - test approach
  - synchronization

- Go life Jan 1st
- Go life delays
- APO functionality and stability
- F&A Service Center
- Business Service Center
- Akquisitions and Divestitures
- Audit-proof Documentation
- Quality Management
  - GMP, GLP, auditors
- Mandatory settings
- New Business Models
  - Re-Organisation

 Compliance
Program Management beyond „point of no return“

Cost 1998 - 2004: 1,2 Mrd € ⇒ 1,7 Mrd € ⇒ 1,9 - 2 Mrd €

Group-wide: 1600 FTEs

Europe: 1200 FTEs
Cost Management / issue Management are essential to secure stakeholder support

- SDP
- APO
- Documentation, QM + GMP
- Delays
- Multi-Project-Management
- New Functionalities
- Mergers, Acquisitions, Divest.
- New Business Model

\[ \sum \text{1,9 Mrd } \€ \]
\[ \sum \text{1,2 Mrd. } \€ \]
What makes Project Management challenging

In part good algorithms exist to come up with good solutions in decision trees

But, especially with future **time horizons of 5 years and beyond**

- in real life algorithmic procedures are still computationally costly
- Often, business and technological data are
  - not available in terms of quality or
  - not available at all
  - change over time

In the end heuristics and - most important - perceptions of decision makers are decisive

Pruning – cutting out options – as full search is no choice

- is a consequence of the vast complexity of a decision tree
- Is a „reflex“ on large negative outcomes, even if suboptimal

**People tend to overvalue losses**

Ca. 1.4 times as aversive as equal-sized rewards attractive

There is no such thing as a pure IT-Project

Business buy-in is necessary:

- To meet business demands

- To gain tolerance for IT issues

- To avoid that IT is perceived
  - as a barrier to realize new business opportunities
  - as „Governance“

- To get moving budgets approved
Scope to be covered by IT

Business needs of an International Company

Role of IT within the company
- No Business without IT
- Conflict Management
  - Business needs
  - IT needs

Basic business transactions
- Logistics
- Finance & Accounting

Application Clusters
- Research
- Production
- Engineering
- ......

Basic elements of IT-landscape
- ERP := backbone for business transactions
- Non-ERP:= systems for application clusters
- Company systems open for externals:= front-end business transactions
- External Systems open for employees := transactional, information exchange
Basic layers to be covered

- Financial Management
- Supply Chain Management
- Supplier Relationship Management
- Customer Relationship Management
- Asset Management

- Human Resources Management
- Executive Management Support
- Project Management
- Compliance Management
What are the basic business characteristics impacting IT-Projects?
Basic characteristics of an International company

- Customer/product profiles
- Product/Usage Areas
- Product Scope in terms of global/regional/local
- Economies of Scale for Research and Product-Technology
- Competitive Structures
- Necessity to launch new products simultaneously in all key countries
- Regional/global authorities
- Globalized communities, e.g., NGOs

It is decisive to understand in

- business terms
  - which areas are global, regional or local
  - Synchronous or a synchronous exchange is needed
- In terms of IT
  - To work out/assess the most sensitive business requirements
  - To come up with robust cost estimates
Bayer: Science For A Better Life
Business is restricted or enabled by IT?

Critical questions:
- when and why to go for separate systems for **business needs**
- Global or Regional or local system
- Company vs Business Group systems

Business Needs:
- Products
- Customers
- Competitors
- Regions
- Regulations/Compliance
- Organizational set-up of value chain
- Cooperation with other external companies
- „one logical system“

Encapsulation to manage down systems complexity but - how to guarantee groupwide and businesswide defined settings and needs

IT-Cost over the whole life-cycle:
- Development Cost
- System implementation cost
- Running cost
- Maintenance cost

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16.04.2012
Production structure

just some factors to be considered

**Plant-Technology**

- **Technical characteristics**
  - Technology needs
  - Available product profiles
  - Scaling
  - Production costs

**Plant Locations**

- Distances
- Accessibility
- Transportation costs
- Transportation time

**Customers**

- Locations
- Need for identical products around the world

**Countries**

- Call for production site
- Regulations
- Political, legal situation
- Availability resources, e.g. energy, qualified personnel
- Export / import possibilities
- Currency
Characteristics of Production-Networks

For a given product worldwide - due to many reasons - many production plants exist.

Nowadays with improved production-technologies the quality of products produced in different plants becomes more and more the same.

Using the worldwide available capabilities of transport-logistics and region/global IT-Systems, global production networks can be implemented.

These enables Global Sourcing to manage all production plants and enables to deliver products to worldwide operating customers from the best suited plants.

The network of global suppliers, production locations and customers can be realized by a corresponding IT-System.
Only international IT systems will meet the requirements

Example: Production Network for Plastics
Global from the very beginning

Bayer AG/Germany: 148 years

UK: 141 years

France: 139 years

Spain: 127 years

Italy: 126 years

Brazil: 115 years

China: 129 years

Mid. Eastern Europe

Japan: 10 years

Present in more than 180 countries
To be present in growth markets is key

Examples Bayer:

Since 1990 share on Sales for Asia doubled from 10% to 20%
Until 2015 Asian Sales are planned to grow by 60%

Ca. 60% of Polycarbonat Sales are in Asia, 30% in China.
The Global Headquater for Polycarbonat was transferred from Leverkusen to Shanghai

The Headquarter for General Medicine was transferred from Berlin to Peking.

Ca. 40% of all Pharmacovigilance Cases are processed in Sao Paulo
From 2005 to 2010, in the internal Sales Ranking Brazil moved up from 10th to 5th place.
A Decade of Increasing Focus for Growth

<table>
<thead>
<tr>
<th>1996 Sales €24.9bn</th>
<th>2005 Sales €31.4bn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generic</td>
<td>Schering</td>
</tr>
<tr>
<td>Household insecticides</td>
<td>Roche OTC</td>
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<tr>
<td>Plasma</td>
<td>Chiron Diagnostics</td>
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<tr>
<td>Antitrust requirements</td>
<td>Visible Genetics</td>
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<tr>
<td>To be divested</td>
<td>Pritor</td>
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<tr>
<td>To be divested</td>
<td>Aventis CropScience</td>
</tr>
<tr>
<td>spun-off</td>
<td>Flint</td>
</tr>
<tr>
<td>divested</td>
<td>Seed Treatment activities</td>
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<tr>
<td>divested</td>
<td>Lyondell Polyols</td>
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<tr>
<td>divested</td>
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<td>divested</td>
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</table>

**Major examples since 1996**

**Headcount 142,200**

*Pro-forma combined business of Bayer and Schering*
The international network is the foundation of an international business

- Access to markets
- Access to resources, including access to talent
- Ability to grow
- Balance risks across all markets
- Finance and leverage investments, especially in production and research

Resources distribution is constantly evolving over time, especially:

- Markets/Customers
- Regional Headquarters
- Productions sites
- R&D centers
- Service centers
- Talents

Important:
Don’t move the people to the existing working places
Move the work to the places where the people are
Change is constantly evolving

only the speed of change varies over time

<table>
<thead>
<tr>
<th>Region</th>
<th>2010</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latin America</td>
<td>5%</td>
<td>7%</td>
</tr>
<tr>
<td>North America</td>
<td>21%</td>
<td>11%</td>
</tr>
<tr>
<td>Europe</td>
<td>24%</td>
<td>14%</td>
</tr>
<tr>
<td>Asia</td>
<td>43%</td>
<td>60%</td>
</tr>
<tr>
<td>ROW</td>
<td>7%</td>
<td>8%</td>
</tr>
</tbody>
</table>

Global Chemical Market

2.0 tn € 4.9 tn €

Source: Roland Berger: A different world – Chemicals 2030, 2012
International Companies need to adjust to International Markets

Source: Deutsche Bank, Status April 2012 Perspektiven, 04/2012, p.2

100 := 3.5%

Asia ex China

Asia

China

USA

Other Emerging Markets

Other industrialized countries

24

64

40

17

2

40

17

2

100 := 3.5%
Selected Key topics of IT - Projects
Group wide = worldwide harmonized Data- and Process Structures

Build Up of group wide identical SAP-Organizational Structures is a basis for integrated processing of business and benchmarking across locations and procedural steps

⇒ Determination of plant chains in the locations
  • Arrangement of process steps
  • Assignment of Cost Centers by process steps
⇒ Definition of cost types and assignment to cost centers
⇒ Harmonized layers of production costs
⇒ Unified master data: products, customer, supplier, assets, materials
APO and R/3 are highly cross-linked: „screwed in”
To define the basic Structures is decisive.

Legal Entities

Business Segments
- Life Sciences
- Polymers
- Chemicals

Central Services

Grouped into Regions/Country groups

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The number of SAP users defines extraordinary demands.
Training of users is an absolutely sensitive matter

Training Concept

Train the trainers

Select Power users

Timing within 8 weeks before a go-life
Important Risk Categories

Corporate Risks

**Operational Risks**
- R&D
- production
- market
- etc.

**Financial Risks**
- market
- liquidity
- default

**Infrastructure Risks**
- organization

**Management Risks**
- decision-making process

Source: Kuehn / Konzerntagung 2002
Compliance: Data & Processes in Business Terms across the whole IT Systems landscape

- Completeness + Correctness
- Development System – Quality Assurance System – Operating System
- defined and comprehensive tests : unit tests -> integrated tests
- Evidence of proof
- Traceability Trails
- Verifiability -> Documentation, Protocols
- Risk Assessments
- Clear lines of responsibilities

➢ Decisive: All measures to be defined before acting
    ➢ retrospective measures are out -> especially in Pharma

Deployment 3.0: Shared Services Bayer AG:

Critical transactions

1400
to approve a bill≠ to release a bill

800
Mandatory Settings, u.a GEW

250
Rolls

Internal / external Control system
ERP=Enterprise Resource Planning Systems: success-critical for companies

**ERP-Systems are the basis for consistent operation of all economical and logistical processes in a company**

- Great interdependence with all economical and logistical processes
- System has to be audit-proofed
- Used by a high portion of all employees > 80%
- Long life cycle ca. 30 yrs
- Introduction / major redesign ca. 5 years

- Introduction and redesign to be managed by large-scale projects only.
- Such Projects
  - last several years
  - tying up massive business and IT resources
  - Not just an IT project but a business project

- Responsibility is with Top Management / Business
E-Commerce: Processes from Order Entry and Order Confirmation

- Order Entry
- Order Prioritizing
- Pricing
- Credit Limit
- Product Availability
- Export Control
- Delivery Conditions

Functionality within ERP-Systems

Relevant for E-Commerce Integration
What is essential to understand the role of IT
IT is mission-critical

Structure follows strategy → strategy follows structure?

Structure significantly influenced/restricted by systems

- Business Processes
- Audit-proof operation
- Costs
- Scope

IT-Costs { Time, People, hardware } are top priority

- Development
- Operations – running the system landscape
- maintenance
Software by itself is a challenge

- The product is not material -> dependent on documentation
- Progress is difficult to be stated objectively
- Software development doesn’t evolve deterministically
- No clear understanding of the development process
- Strong tendency for unique solutions
- Low prio for standardization
- Limited possibilities to replace „experts“
Challenges Softwareprojects

- Fuzzy and moving targets
- Non pre-defined states of development
- Politically correctness
- Influence on organizational structures
- Not core-business but significant influence on overall organization
- Significant tie-up of resources
- Consultant-Management
- Complex Multi-Projekt-Management
- Implementation and „research“ projects at the same time
What are the conflicts between Business and IT?
IT as perceived by the Business

- A tendency to resist change
- No sense for business urgency
- Painfully slow
- Extremely costly
- Never meet the budget
- IT is restricting business by using compliance driven governance
- IT is a pain point
Business as perceived by IT

- Due to the time needed for Development as well as for Maintenance, new business driven requirements frequently are thrown in before an ongoing IT – Task is completed.

- IT-initiated projects to clean up existing historically grown-up landscapes, functionality-clusters, complex and unstructured code, all the time higher business priorities taking away resources.

- Business plans are not well defined and not adhered to.

- At times, the business environment is changing at such a rapid pace that a system might be outdated when it is implemented.

Constant pain point, already at least at the 1980s

See too: Dekleva, 1992, pp. 10-17
Conflict between Business and IT

Often problematised are ERP – Systems

✓ with a life cycle of 30 to 40 years
✓ which comprises the whole body of business transactions along the whole value chain
✓ with a huge user community addressing ca. 80% of all employees and
✓ Addressing huge customer as well as supplier communities

But, the conflict is a constant pain point
Web 2.0

For the time being, Web Services are an highly dynamic area for both, business as well as technology

Latest communication technologies allow for and drive change:
- Highly connected \{technology push\} and \{market pull\}

  Sustainable change of people behavior in private, public and professional communication

  Consumer/Private market drives professional market

  But- compliance is to be managed at any time
Social Media Marketing

Internet: informational medium \rightarrow social platform

Most important:
self-organized communities using Web-Technology became an established player with new behavioral characteristics
Why things go wrong?

Boundary Conditions:

Almost never there is a start from scratch

All the time business processes based on legacy systems/challenging landscapes exist.

By no means, interfaces are trivial but often highly complex developments

Business changes are not per se synchronized with technological cycles
No budget nor time to migrate to e.g. a SOA architecture

New opportunities are most of the time fuzzy and develop with changing business/usage as well as technical characteristics

To define business opportunities or business needs based on new opportunities is in the beginning often a „mess“

To be managed:
To come up with solid assessments about the future beyond a five-year horizon is a stretch
But e.g. pharmaceuticals, airplanes have development cycles well beyond 10 years
Business Process Reengineering: „the“ challenge

• **User:** the recipient of the output or the initiator of service delivery

• **Payer:** the individual charged for the service or has budget approval

• **Stakeholder:** someone impacted by service quality, but hasn’t line or budget authority

• **Governor:** someone responsible for policy, compliance and company-wide program initiatives

• **Process Partner:** someone involved in service delivery, but outside process concerned
Accepting Challenges
The integration of IT and functional tasks is key to manage TCO. Skill Management is decisive.

Example: Finance & Accounting

Sensitive skill area

IT tasks

F&A functional tasks
On some critical characteristics

- Robustness vs. Agility – manage degree of freedom
- Encapsulation – separate what is not connected via the laws of thermodynamics
- Abstraction
- Active Management of worst cases := Fukushima
- Scaling up / scaling down
- Synchronous vs asynchronous
- The world is flat vs the world is different
Check for assumptions based on stretched Rationality

Rational Expectations Hypothesis (REH):
The future is based on mechanical rules derived from the past

Challenge for REH:
Inability to define overarching rules coping with nonroutine change and ever imperfect knowledge

Imperfect Knowledge Economics (IKE)
Impossible to capture future developments with overarching mechanical rules

It is of utmost importance to identify problems which can only be solved with contingencies

See: Frydman, Goldberg, 2011, pp. 1-17
Decision problems are most of the times multi criteria driven, many criteria are not known or covered by „hidden agendas“

To optimize Processes under changing structures, often mathematics is not the real challenge. The ultimate challenge is the decision about
• the target function and
• the definition of the feasible solution

Those who succeed with their targets/priorities and restrictions will „win“.

Important to remember all the time: Risk

A decision is very good, if done in time, performs „good“ under different „futures“ and the risk of desaters can be managed down
**Ultimate Target: generating „good“ solutions over time**

<table>
<thead>
<tr>
<th>BUSINESS</th>
<th>IT</th>
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<tbody>
<tr>
<td>Changing Business Models</td>
<td>Value-Chain: global / regional / local</td>
</tr>
<tr>
<td>Different businesses</td>
<td>Standardized Data / Process clusters</td>
</tr>
<tr>
<td>&gt; 150 Countries</td>
<td>One System vs Decoupled Systems</td>
</tr>
<tr>
<td>Moving growth Clusters</td>
<td>Sustainable Structures: 20-30 yrs</td>
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<tr>
<td>Transfer of Business Headquarters</td>
<td>Implementations w embedded Research</td>
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<tr>
<td>Akquisitions/Divestitures</td>
<td>Staff-intensive International Teams</td>
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<tr>
<td>Delays</td>
<td>User Training</td>
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<td>Compliance</td>
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<td>Cost Expectations</td>
<td></td>
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<tr>
<td>Fast, moving targets</td>
<td>Slow</td>
</tr>
<tr>
<td>No sustainable plans</td>
<td>Costly</td>
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<tr>
<td>Outpowering IT</td>
<td>Exercising Governance</td>
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Skill Management
Robust Solutions
Rationality vs Imperfect Knowledge