IEI6A2 Filsafat Teknik Industri

Perkembangan Bisnis

Prodi S2Teknik Industri – Fakultas Rekayasa Industri

Course Learning Outcome (CLO)

mampu menjelaskan relasi antara keilmuaan industrial engineering dan dan perkembangan bisnis

Perkembangan Kajian

	Periode				
Focus	Scientific Management	Administrative and Behavior Management	Operation Research	Systemic and Integrated System	Global and Information
Focus of Improvement	Method Improvement	Management Improvement	Optimal Solution	Effective Decision	Autonomous Decision & Equilibrium
Main aspect of Integrated System	Interaction Man-machine-material	Human Interaction	Quantitative Aspect	Holistic Aspect	Information
Component of Integrated System	Man, Machine, Material	Man, Machine, Material	Man, Machine, Material	+ Environment	+ Network
Basic Principle	Principle of Scientific Management	Principle of Management	Optimization	System Thinking & Modeling	Information Technology
Main Tool	OPC	POEC	OR	SPK	Multi agent
Solution	Better	Better	Optimal-Local	Best-Global Optimal	Best

Sumber : Workshop PTI, ITB 2020

Evolution of Integrated System

| Type	Components	Science	Performance
Work	Man, Machine & Material	Ergonomic, Psychology, Engineering Economy	Efficiency Productivity
Manufacturing	Man, Machine, Material, Information, Energy	PPIC, Inventory, OR, Quality Control, Lay - out, Modeling	Quality, Cost, Delivery (QCD)
Company	People, Facilities, Material, Information, Energy	Management, Information System, Behavior Science	Return (ROI, ROE, IRR, etc.)
Supply Chain	People, Facilities, Material, Information, Energy	Systemic & Integrated	Productivity, Competitiveness

Evolution of Integrated System

| Type	Components	Science	Performance
Industrial System	People, Infrastructure, Material, Information, Energy	Policy, Stake holder, Social Sciences, Economics, etc.	Competitiveness Growth
Real System	People, Infrastructure, Material, Information, Energy	Politics, Social, Ethics, etc.	Competitiveness Growth Welfare

System View of IE Thought

| Method & Management Improvement	Optimal Solution	Effective Decision	Effective Decision & Equilibrium
Analisis-Sintesis-Desain	**Matematika & Statistika**	**Artificial Intelligent**	**ICT**
✓ Grafis ✓ Mathematic ✓ Behaviorist	✓ Optimasi Klasik ✓ Operation Research ✓ Simulasi	✓ Decision Support System ✓ Expert System	✓ Multi Agent System
Component System	Closed System Hard System	Open System Soft System	Global System
Scientific Management / Adm & Behavior Management	Management Science	System & Integrated	Global & Information
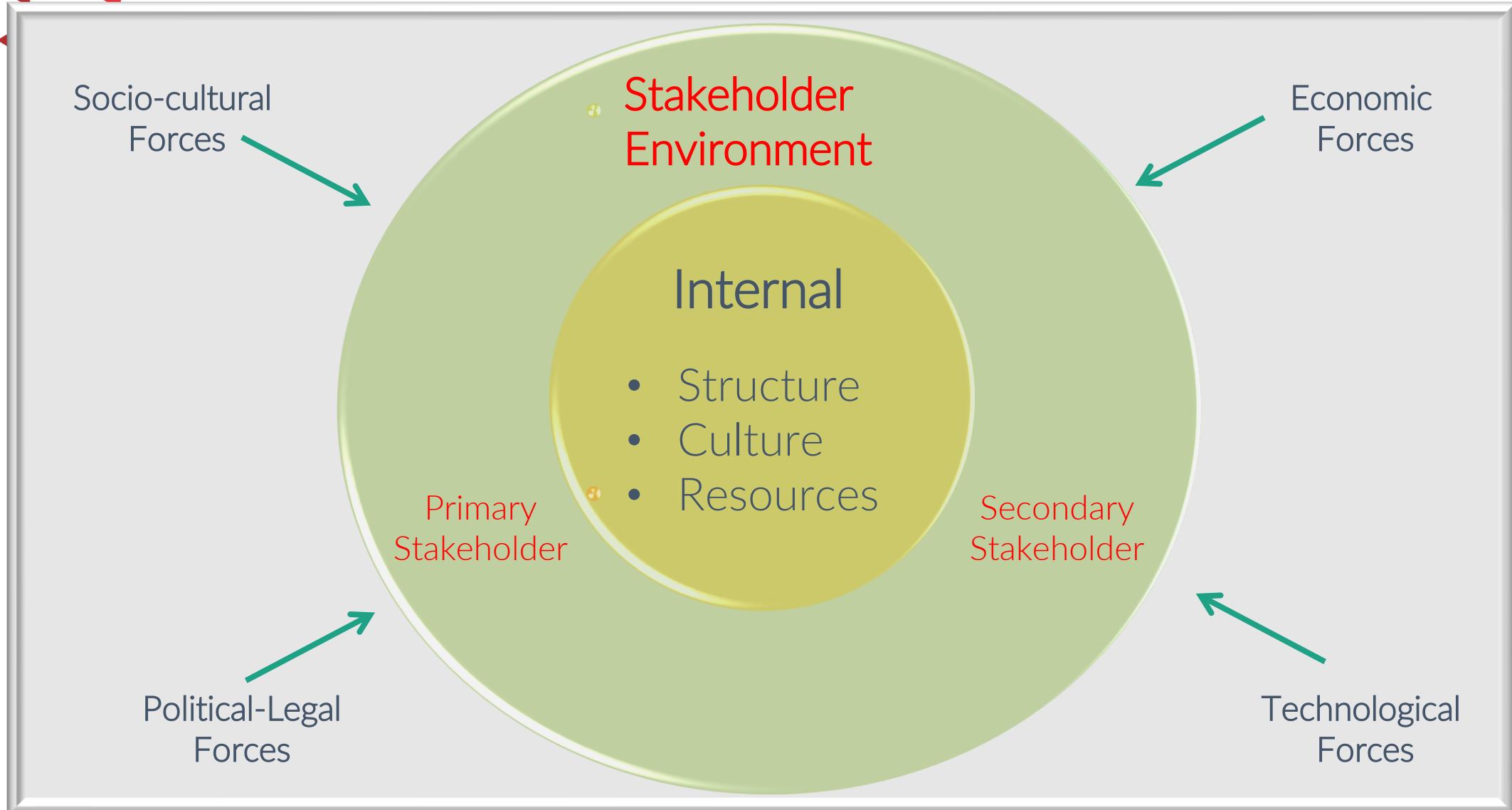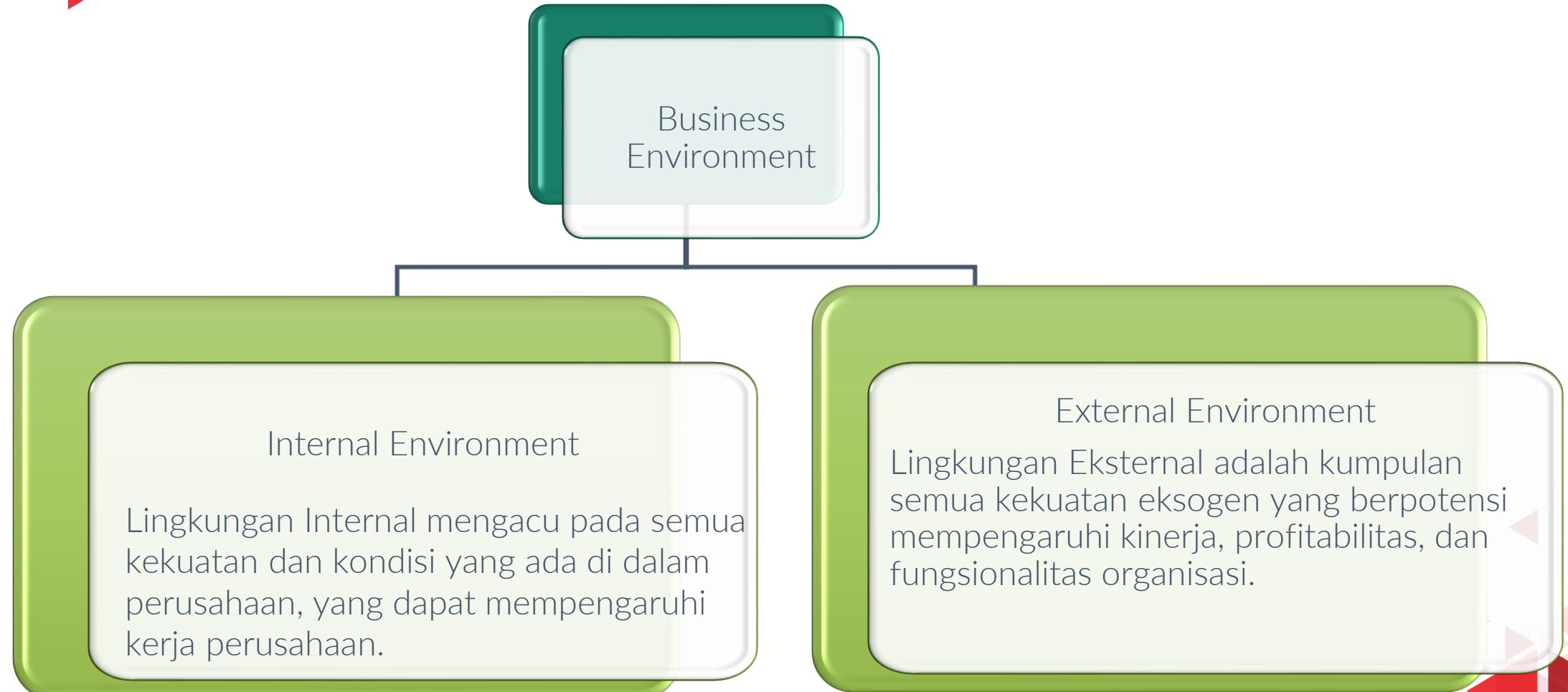
Environment
Societal Environment

Socio-cultural Forces

Economic Forces

Stakeholder Environment

Internal

- Structure
- Culture
- Resources

Primary Stakeholder

Secondary Stakeholder

Political-Legal Forces

Technological Forces

Sumber : materi workshop PTI, ITB 2020
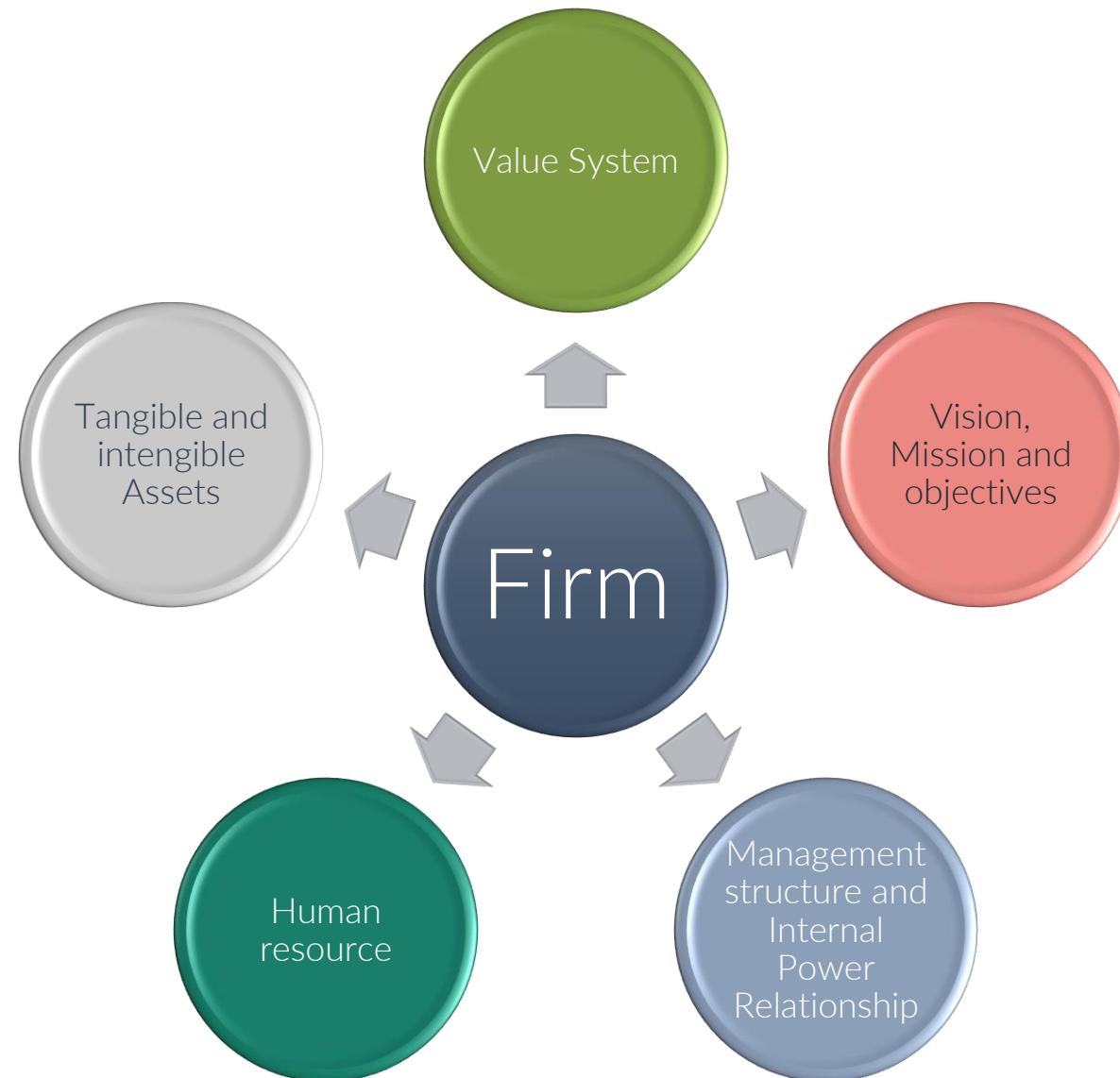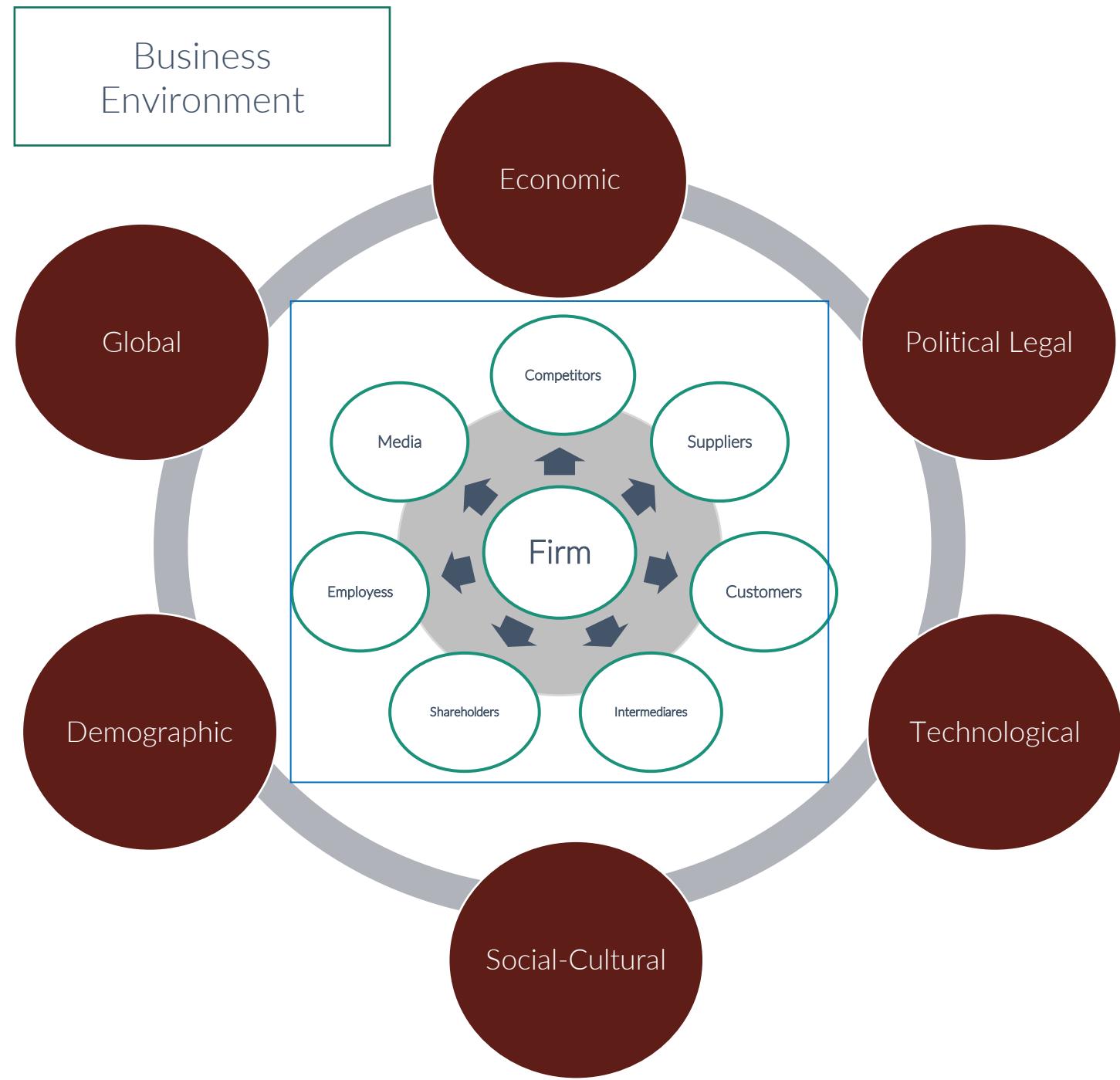
Internal and External Business Environment

Business Environment

Internal Environment

Lingkungan Internal mengacu pada semua kekuatan dan kondisi yang ada di dalam perusahaan, yang dapat mempengaruhi kerja perusahaan.

External Environment

Lingkungan Eksternal adalah kumpulan semua kekuatan eksogen yang berpotensi mempengaruhi kinerja, profitabilitas, dan fungsionalitas organisasi.

Internal Factors

Business Environment

Economic

Global

Political Legal

Demographic

Technological

Social-Cultural

Firm

Competitors

Media

Suppliers

Employess

Customers

Shareholders

Intermediares

Industrial Engineering

Industrial Engineering Is Concerned With the Design, Improvement, and Installation of Integrated Systems of People, Material, Information, Equipment, and Energy. It Draws Upon Specialized Knowledge and Skill in the Mathematical, Physical, and Social Sciences Together With the Principles and Methods of Engineering Analysis and Design to Specify, Predict, and Evaluate the Results to Be Obtained From Such System

Kompetensi

Kompetensi adalah kemampuan (ability) atau kapasitas seseorang untuk mengerjakan berbagai tugas dalam suatu pekerjaan, dimana kemampuan ini ditentukan oleh dua faktor yang kemampuan intelektual dan kemampuan fisik. (Stephen Robbin, 2007:38)

"an underlying characteristic of an individual that is casually related to criterion – referenced effective and/or superior performance in a job or situation" (Spencer Dan Spencer, 1993)

Kompetensi adalah karakteristik yang mendasari seseorang dan berkaitan dengan efektivitas kinerja individu dalam pekerjaannya.

Kompetensi

Istilah

Underlying Characteristics : kompetensi adalah bagian dari kepribadian yang mendalam dan melekat pada seseorang serta perilaku yang dapat diprediksi pada berbagai keadaan dan tugas pekerjaan.

Causally Related : kompetensi adalah sesuatu yang menyebabkan atau memprediksi perilaku dan kinerja.

Criterion Referenced : kompetensi sebenarnya memprediksi siapa yang berkinerja baik, diukur dari kriteria atau standar yang digunakan.

Five Types of Competency Characteristics
(Spencer and Spencer, 1993)

1. Trait

2. Motive

3. Self Concept, Attitudes, Values

4. Knowledge

5. Skill

Kompetensi

Karakteristik Kompetensi (Spencer & Spencer, 1993) :

1. Motif (kemauan konsisten sekaligus menjadi sebab dari tindakan).

adalah hal-hal yang seseorang pikir atau inginkan secara konsisten yang menimbulkan tindakan. Motif akan mendorong, mengarahkan perilaku, terhadap tindakan atau tujuan tertentu.

2. Faktor bawaan (karakter dan respon yang konsisten).

adalah karakter fisik dan respon-respon konsisten terhadap situasi atau informasi.

3. Konsep diri (gambaran diri).

adalah sikap dan nilai-nilai yang dimiliki sesorang. Nilai yang dijunjung tinggi seseorang serta suatu sikap terhadap sesuatu yang ideal, dicita-citakan yang diwujudkan dalam pekerjaan atau kehidupanya.

Karakteristik Kompetensi (Spencer & Spencer dalam Sudarmanto (2014:53))

4. Knowledge (informasi dalam bidang tertentu).
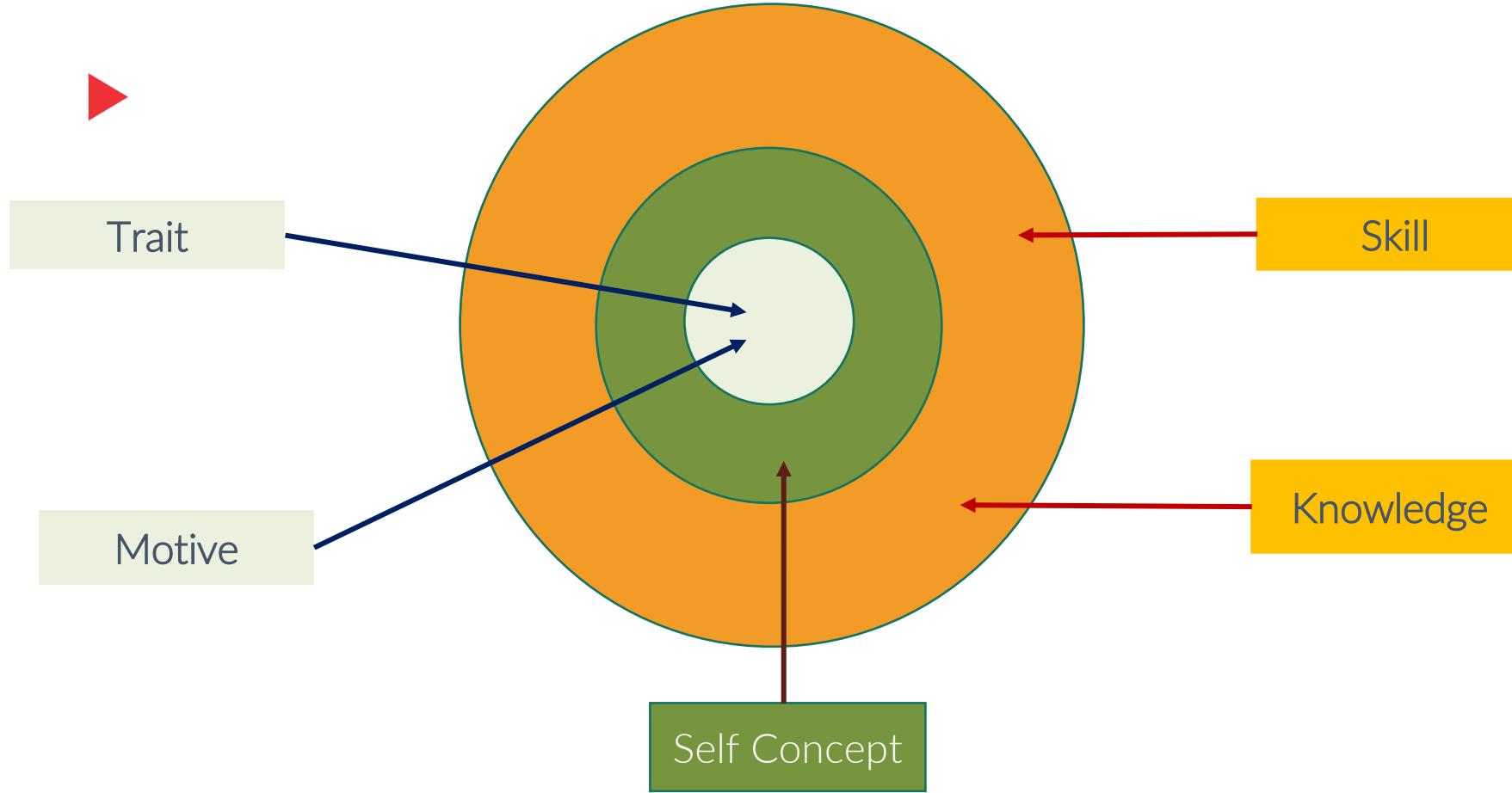
adalah infromasi yang dimiliki seseorang untuk bidang tertentu. Sumber-sumber pengetahuan diperoleh dari hasil telaah (*study*, *learning*) dan pengalaman (*experience*) serta intuisi (*intuition*). Pengetahuan sebagai kemampuan untuk menyelesaikan tugas tertentu melalui belajar. Belajar adalah mengaitkan secara bersama-sama antara data dengan informasi, pengalaman, dan sikap yang dimiliki seseorang

5. Keterampilan (kemampuan untuk melaksanakan tugas).

adalah kemampuan untuk melaksanakan suatu tugas tertentu baik secara fisik maupun mental. Kompetensi keterampilan mental atau kognitif meliputi, pemikiran analitis (memproses pengetahuan atau data, menentukan sebab dan pengaruh mengorganisasi data dan rencana) dan pemikiran konseptual.

Five Types of Competency Characteristics

(Spencer and Spencer, 1993)

Trait

Motive

Skill

Knowledge

Self Concept

Five Types of Competency Characteristics
(Spencer and Spencer, 1993)

Tampak

Hard Competency
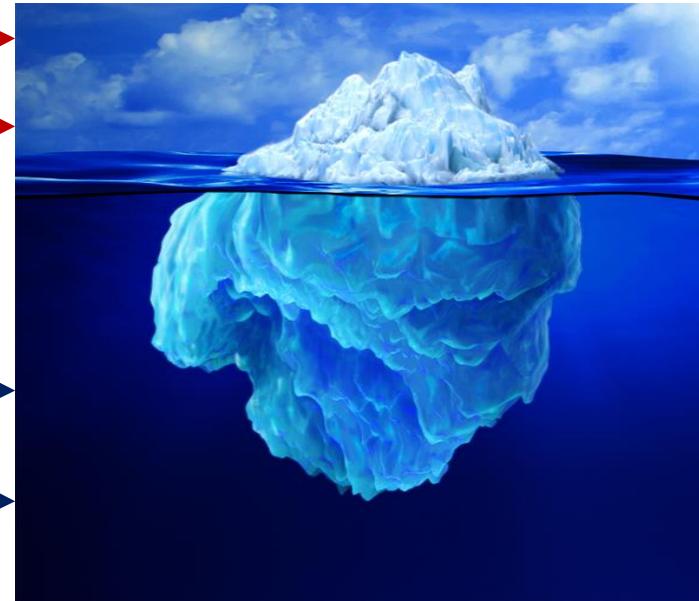
Technical Competency

Tidak Tampak

Behavior Competency

Soft Competency

Kompetensi

Kelompok Kompetensi (Spencer & Spencer, 1993)

1. Kelompok kompetensi perilaku (*behavior competency*),

Merupakan kompetensi yang tidak dapat dilihat secara nyata karena cenderung tersembunyi dalam diri seseorang namun memiliki dampak besar terhadap kesuksesan masa depan.

2. Kelompok kompetensi teknis (*technical competency*),

Merupakan kompetensi yang relatif lebih mudah ditunjukkan atau terlihat secara nyata yaitu pengetahuan (knowledge) dan keterampilan (skill).

KELOMPOK KOMPETENSI

berprestasi dan bertindak (*achievement and action*)

pelayanan (*helping and human service*)

memimpin / mempengaruhi orang lain (influences)

mengelola (*managerial*)

berpikir/ keahlian (*cognitive*)

bersikap dewasa/efektivitas diri (*personal effectiveness*)

Kompetensi berprestasi dan bertindak (*achievement and action*)

Orientasi Berprestasi (*Achievement Orientation*)

Kepedulian Terhadap Keteraturan (*Concern For Order*)

Inisiatif (*Initative*)

Pencarian Informasi (*Information Seeking*)

Kompetensi pelayanan
(*helping and human service*)

Pemahaman Hubungan Antar Manusia (Interpersonal Understanding)

Orientasi pada pelayanan pelanggan (customer service orientation)

Kompetensi memimpin / mempengaruhi orang lain

Dampak dan pengaruh (impact and influence)

Pemahaman keorganisasian (organizational awareness)

Membangun jejaring (relationship building)

Kompetensi mengelola (*managerial*)

Mengembangkan Orang Lain (*Developing Others*)

Pengarahan (directiveness),

Kerjasama (teamwork and cooperation),

Kompetensi berpikir/ keahlian (*cognitive*).

Berpikir analitis (analytical thinking)

Berpikir konseptual (conceptual thinking)

Keahlian teknis (expertise Development)

efektivitas diri (*personal effectiveness*)

Pengendalian diri (*Self-control*),

Kepercayaan, keyakinan diri (*Self-confidence*)

Fleksibilitas (*Flexibility*)

B. Top 15 skills for 2025
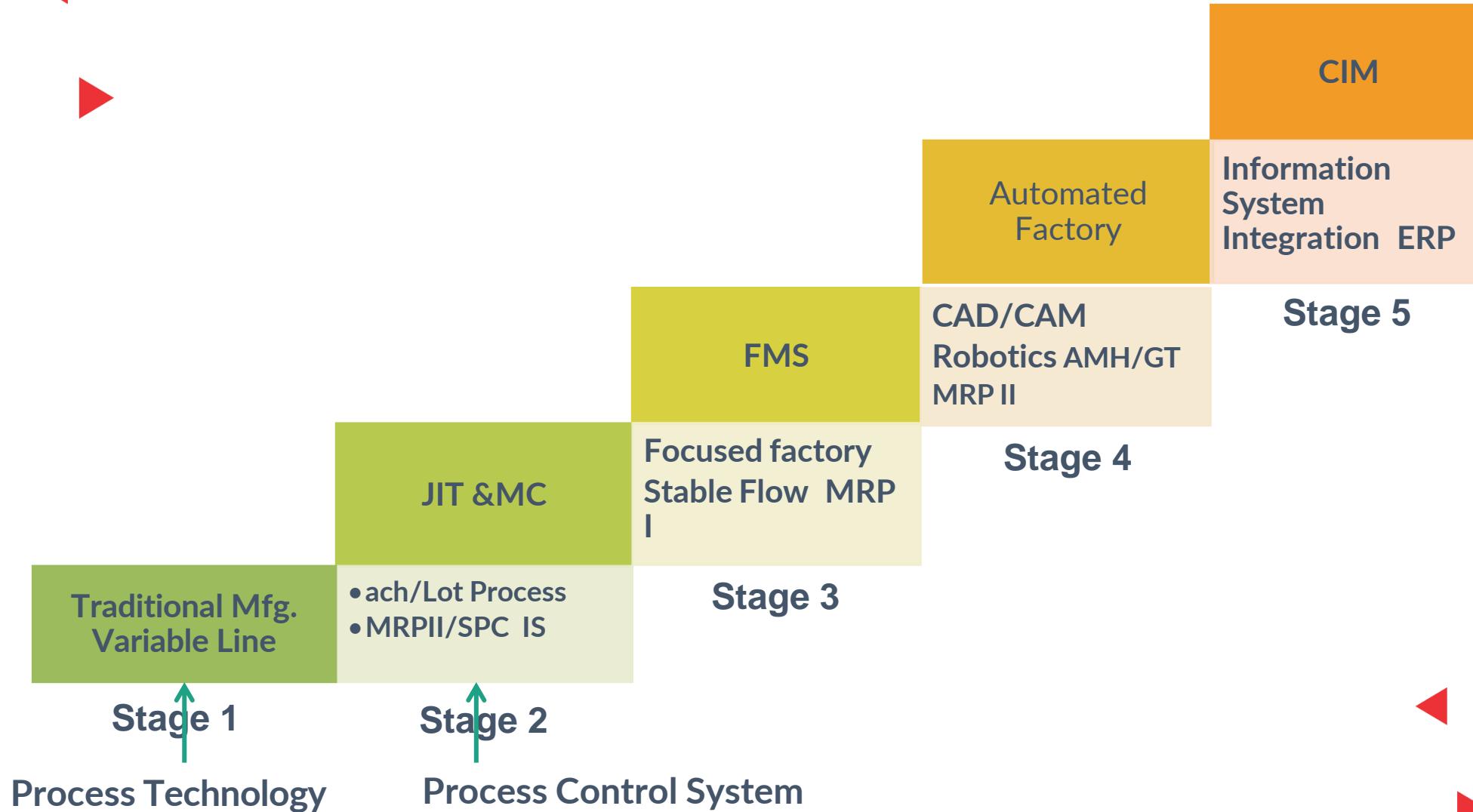
1	Analytical thinking and innovation		9	Resilience, stress tolerance and flexibility
2	Active learning and learning strategies		10	Reasoning, problem-solving and ideation
3	Complex problem-solving		11	Emotional intelligence
4	Critical thinking and analysis		12	Troubleshooting and user experience
5	Creativity, originality and initiative		13	Service orientation
6	Leadership and social influence		14	Systems analysis and evaluation
7	Technology use, monitoring and control		15	Persuasion and negotiation
8	Technology design and programming			

Source

Information Technology in IE

IT Support Toward A CIM

CIM

Information System Integration ERP

Stage 5

Automated Factory

CAD/CAM Robotics AMH/GT MRP II

Stage 4

FMS

Focused factory Stable Flow MRP I

Stage 3

JIT &MC

- ach/Lot Process
- MRPII/SPC IS

Stage 2

Traditional Mfg. Variable Line

Stage 1

Process Technology

Process Control System

IT Support in Business & Industry

50'

Mass Production

IT Support : EDP

60'

New Product

IT Support : IS

70'

Low Cost Manufacturing

IT Support : MRP I-IS

80
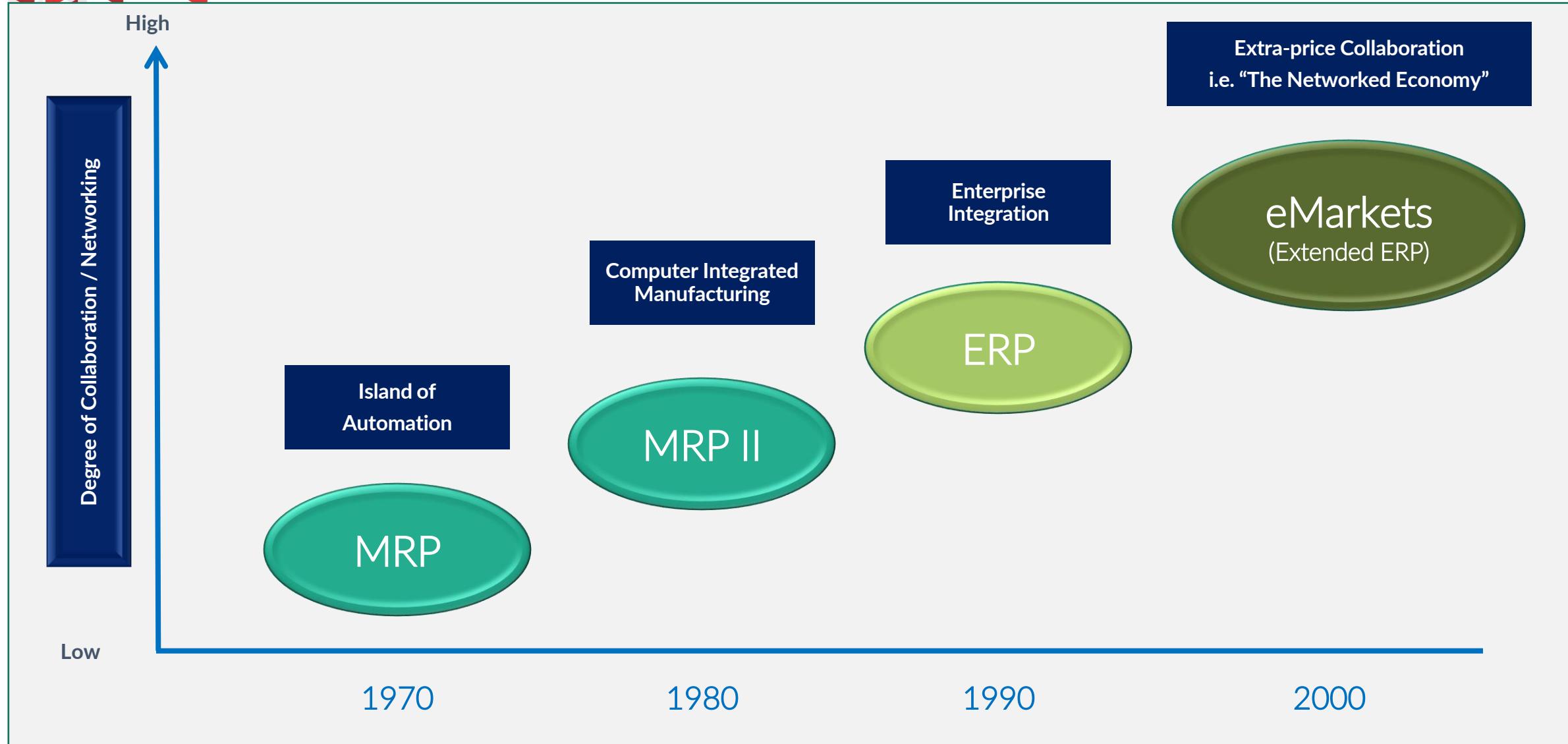
Total Quality Service

IT Support : MRP II-DSS

90'

Speed & Custumor Relationship
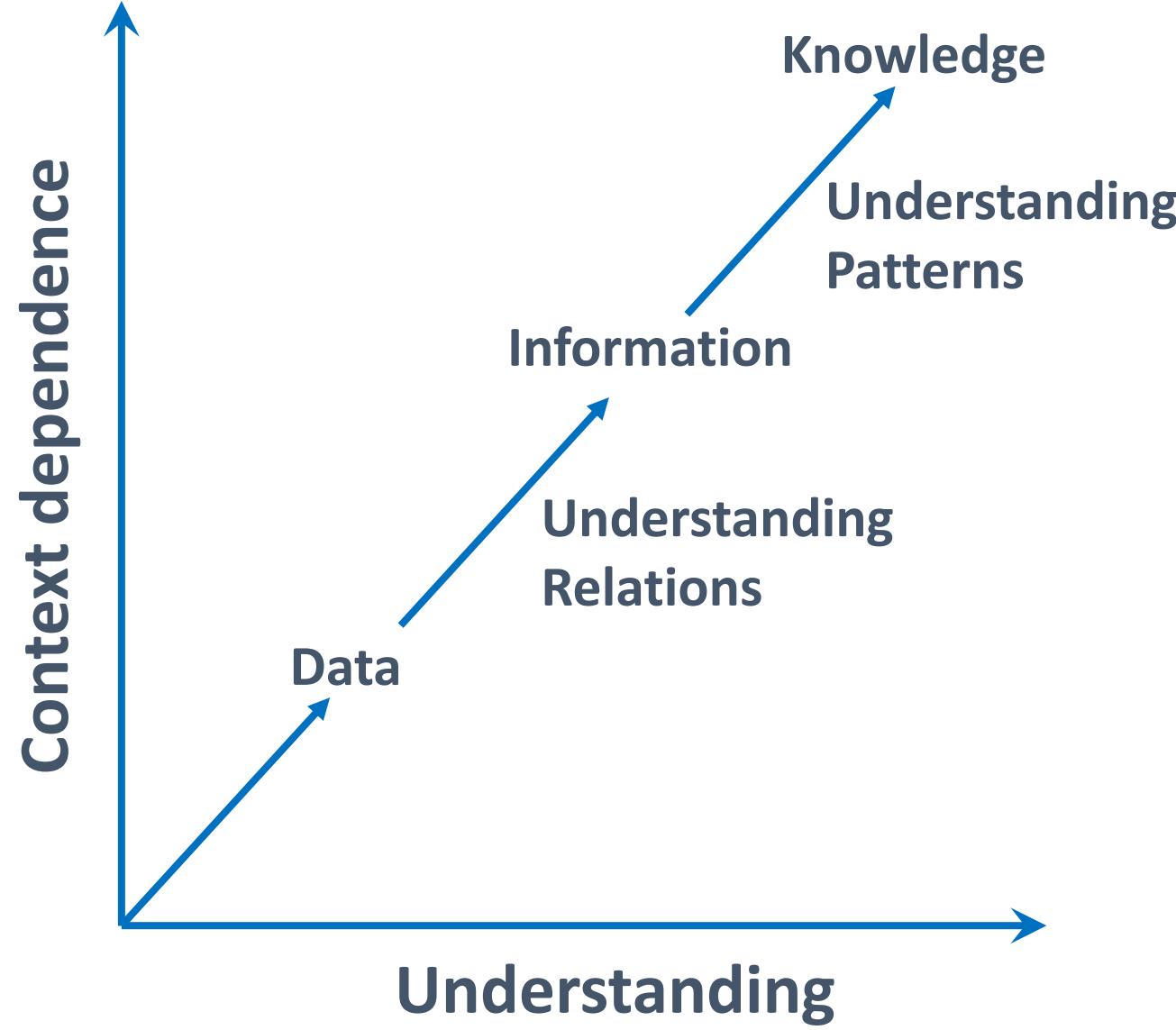
IT Support : ERP - ES

00'

Supply Chain Management

IT Support : e-SCM-MAS

IT Support In Company

CLARIFYING TERMS

Context Indepedence

Knowledge is represented by patterns among data , information and possibly other knowledge. These patterns don't actually constitute knowledge until they are understood

Wisdom is recognition that knowledge patterns arise from fundamental principles and the understanding of what those principle are.

Wisdom

Understanding Principles

Information is represented by relationships between data and possibility other information.

Knowledge

Understanding Patterns

Information

Understanding Relations

Data

Understanding

Data is an item or event out of context with no relation to other things

Adapted from Knowledge Management by Gene Bellinger of Seatlle-based consultancy OutSights.inc

Three sets of issues:

- concerned with how to allocate work functions and control functions optimally among the human and the machines elements comprising the system

- concerning the human being and intelligent machine interface is that of safety

- concerning the interface between human beings and intelligents machines has to do with the question of who has the final say when an intelligent machines wants to do one things and the person wants to do another. At what point and under what condition, should a human being be permitted to override a decision made by an intelligent machines? What about the reverse situation? Should a machine ever be permitted to override the decision of a human being?

Renewable energy

Solar Energy — Solar energy is radiant light and heat from the Sun that is harnessed using a range of ever-evolving technologies.

Wind Energy — Wind energy is the use of air flow through wind turbines to mechanically power generators for electricity

Tidal Energy — Tidal energy is a form of hydropower that converts the energy of the tides into electricity or other useful forms of power
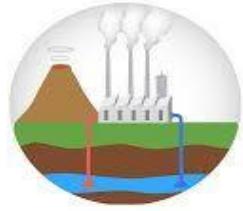
Geothermal Energy — Geothermal energy is thermal energy generated and stored in the Earth. Thermal energy is the energy that determines the temperature of matter

Hydroelectricity — Hydroelectricity is power derived from the energy of falling water or fast running water, which may be harnessed for useful purposes
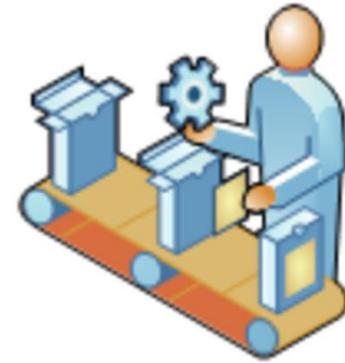
Biomass Energy — Biomass contains stored energy. That's because plants absorb energy from the sun through the process of photosynthesis. When biomass is burned, this stored energy is released as heat

https://climatechange.lta.org/renewable-energy-deployment/

IE Thought & Industrial Revolution

| Machinery	Electricity	Computers	Internet	
1.0	**2.0**	**3.0**	**4.0**	**5.0**
End of the 18th Century	Beginning of the 20th Century	Beginning of the 70th	Beginning of the 20th	Today
Mechanization, Waterpower, Steam power	Mass production, Assembly line, electricity	Computer and automation	Cyber Physical systems	
Scientific Management / Administrative & behavior management	Management Science	Systemic & Integrated	Global & Information	Global and equilibrium
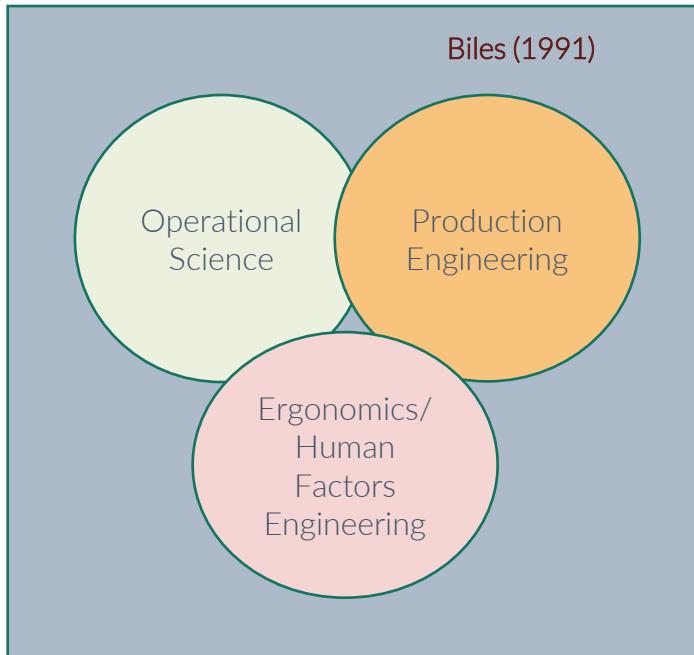
Biles (1991)

Operational Science
Ilmu pengetahuan dan keahlian yang berkaitan dengan pengaturan perilaku dan pengelolaan kelompok kerja seperti Penelitian Operasional, Perancangan Organisasi, Sistem Informasi Manajemen, Analisis Ekonomi, dan lain-lain

Ergonomics/Human Factors Engineering
Ilmu pengetahuan dan keahlian yang berkaitan dengan pemberdayaan manusia dalam sistem integral seperti Ergonomi, Perancangan Kerja (Work Design), Administrasi Pengajiaan (Wage Administration), Keselamatan dan Kesehatan Kerja, dan lain-lain
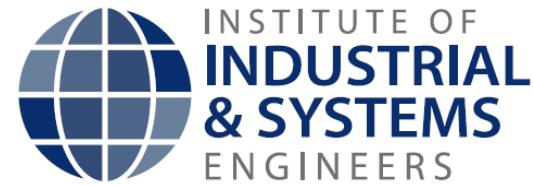
Production Engineering
Ilmu Pengetahuan dan pengetahuan yang berkaitan dengan perancangan dan pengelolaan proses manufaktur serta perencanaan dan pengendaliaan produksi, seperti Perencanaan dan Pengendalian Produksi, Pengendalian Kualitas, proses manufaktur, Tata Letak Pabrik, dan lain-lain
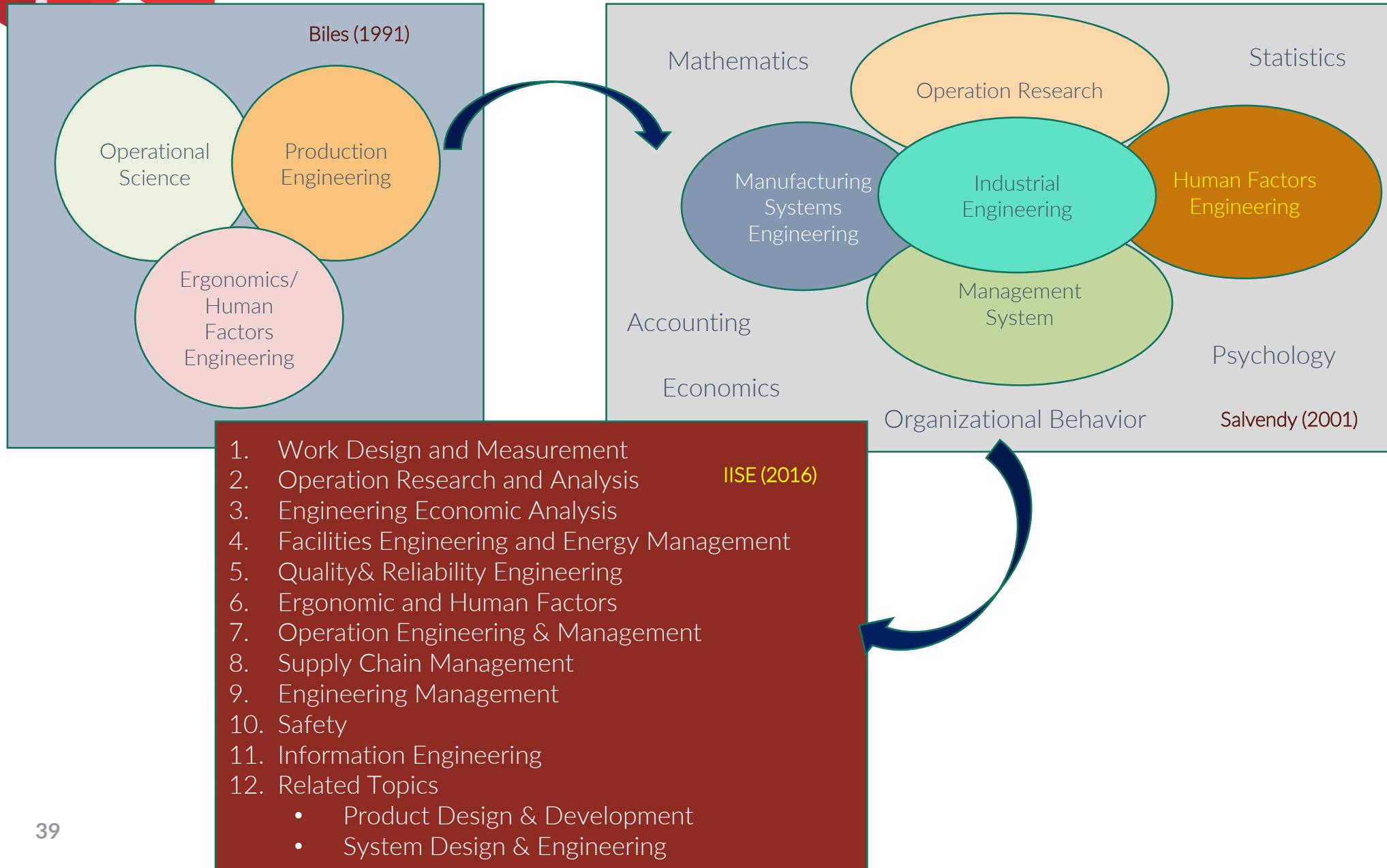
Evolution of IE Body of Knowledge

Biles (1991)
- Operational Science
- Production Engineering
- Ergonomics/ Human Factors Engineering

Salvendy (2001)
- Mathematics
- Statistics
- Operation Research
- Manufacturing Systems Engineering
- Industrial Engineering
- Human Factors Engineering
- Accounting
- Management System
- Economics
- Psychology
- Organizational Behavior

IISE (2016)
1. Work Design and Measurement
2. Operation Research and Analysis
3. Engineering Economic Analysis
4. Facilities Engineering and Energy Management
5. Quality& Reliability Engineering
6. Ergonomic and Human Factors
7. Operation Engineering & Management
8. Supply Chain Management
9. Engineering Management
10. Safety
11. Information Engineering
12. Related Topics
    • Product Design & Development
    • System Design & Engineering