

**115th Jubilee of the Zaporozhye
National Technical University
20th of November 2015, Zaporozhye, Ukraine**



***Engineering Education for the Industrial
Revolution 4.0***

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**“Ovidius” University of Constanta
Black Sea Universities Network**

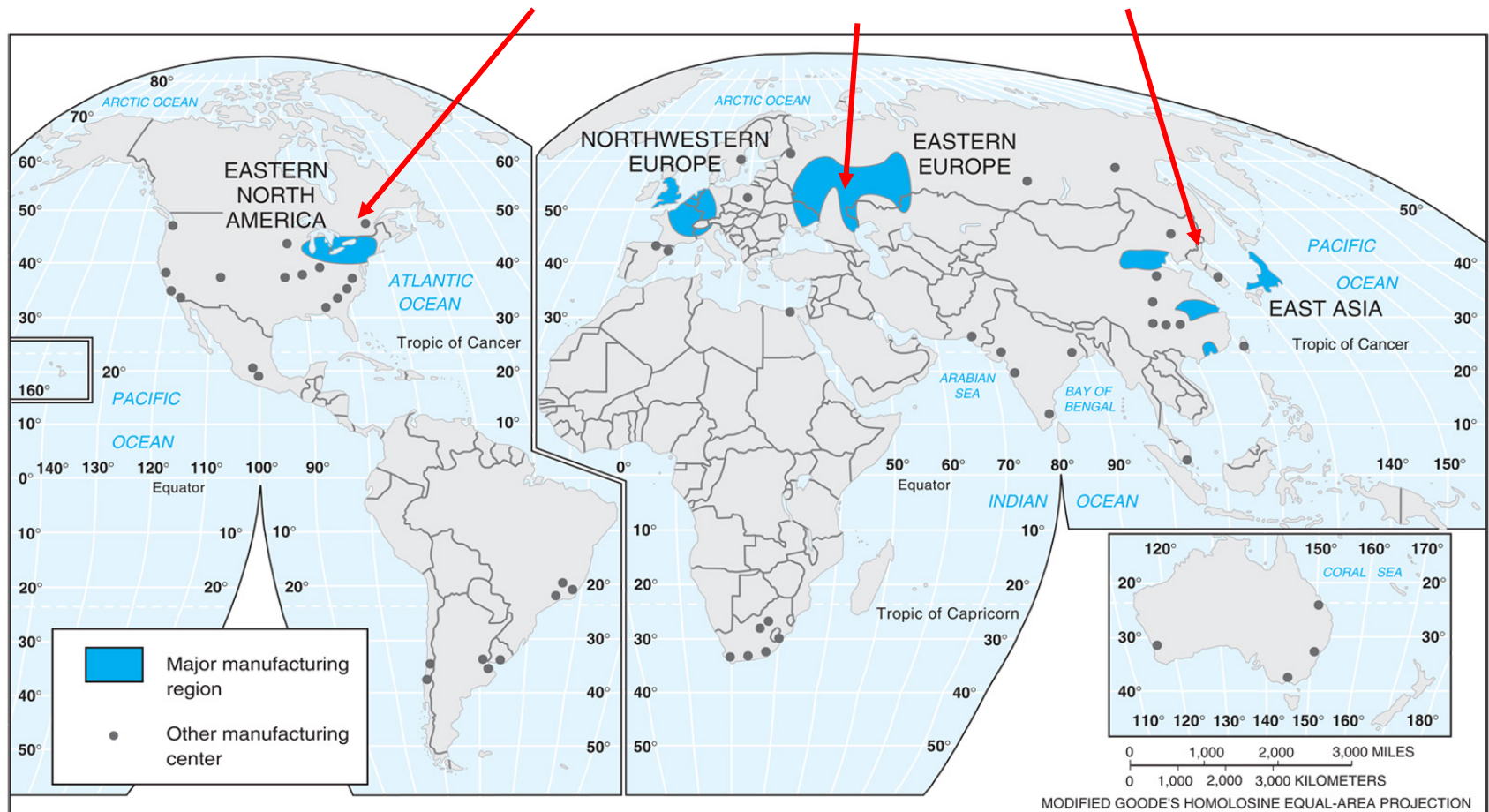


Outline

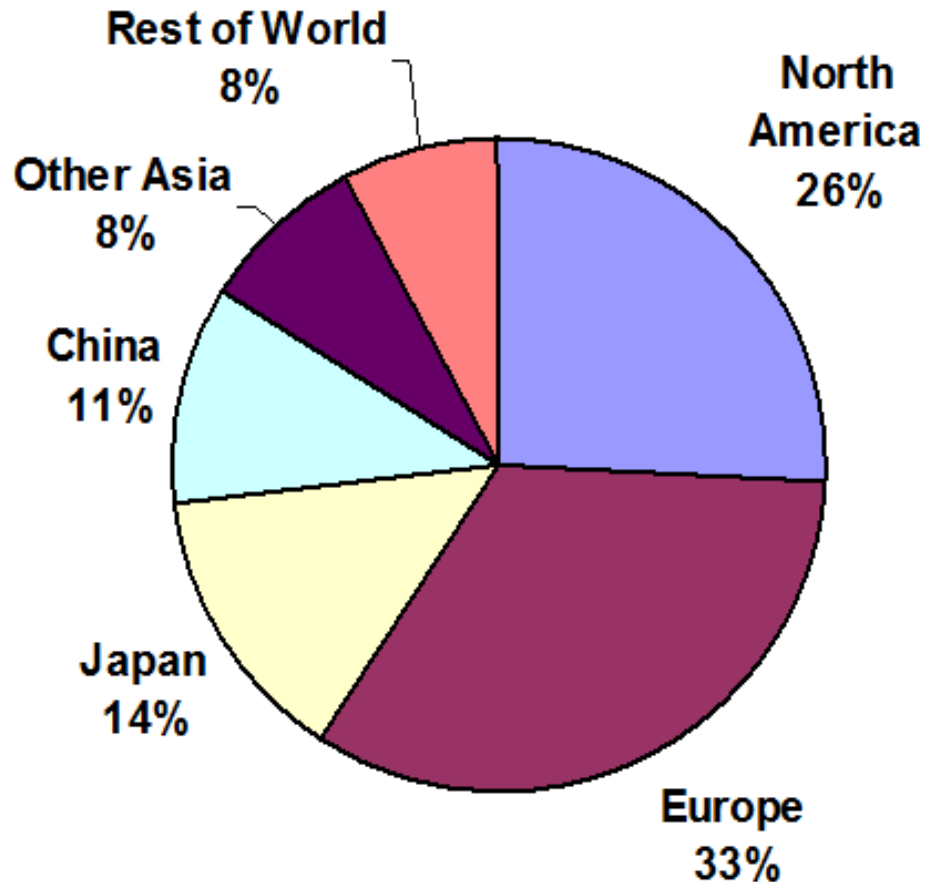
- 1. Current trends in the industry**
- 2. Challenges**
- 3. Pathways to Industrial Revolution 4.0**
- 4. Examples**
- 5. Opportunities**

Current trends in manufacturing

80% of Global Manufacturing Output in Three Regions



Global Distribution Manufacturing Value Added





Current trends in manufacturing

Europe's global economic ranking is changing rapidly. By 2050, Europe's share of world GDP is likely to be half of today's 29%.

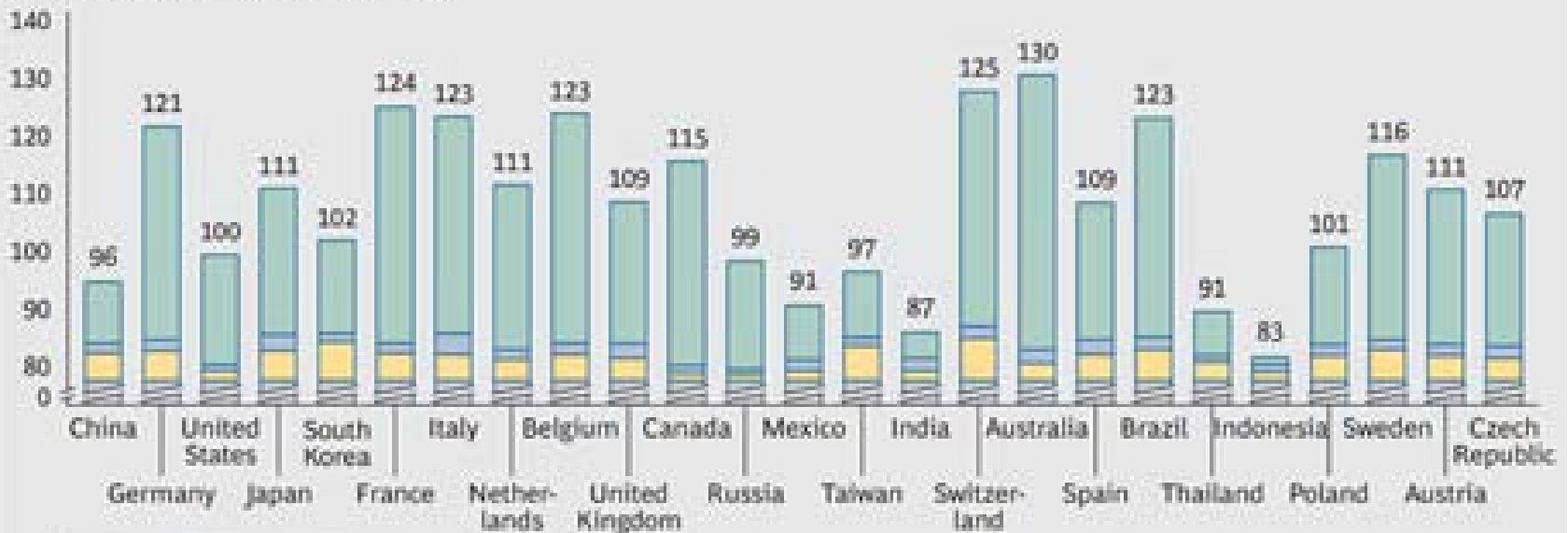
So far, Europe has been able to keep its share of world exports (20%), and in that respect our performance is better than that of other advanced economies.

But China, India and Brazil have started to catch up with the EU by improving their economic performance faster than the EU has, year-on-year, over the last five years.

Global Distribution Manufacturing Value Added

EXHIBIT 1 | Comparing the Top 25 Export Economies

Manufacturing cost index, 2014 (U.S. = 100)



Volume of exports (highest to lowest)

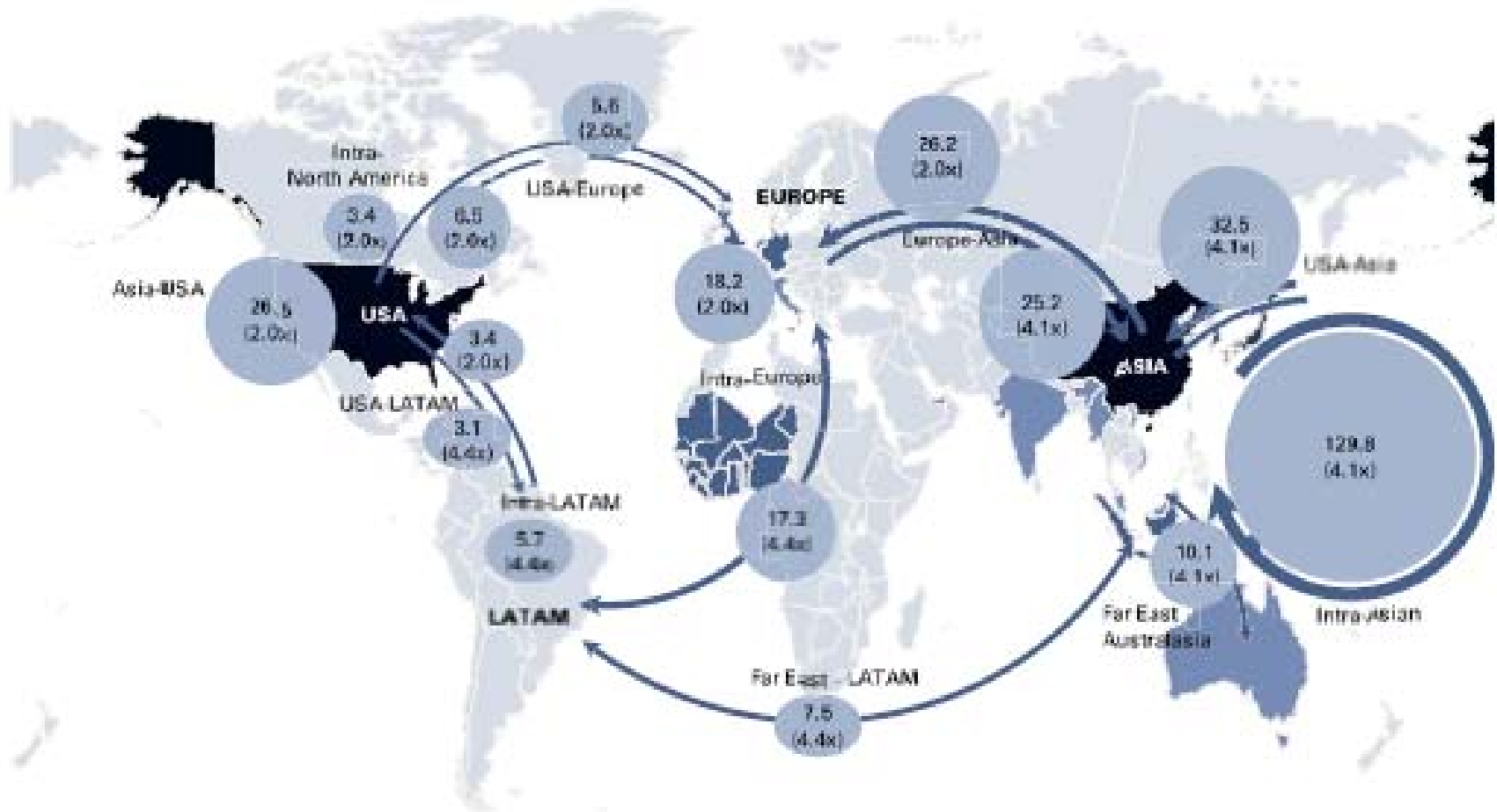


Sources: U.S. Economic Census; U.S. Bureau of Labor Statistics; U.S. Bureau of Economic Analysis; International Labour Organization; Euromonitor International; Economist Intelligence Unit; BCG analysis.

Note: The index covers four direct costs only. No difference is assumed for other costs, such as raw-material inputs and machine and tool depreciation. Cost structure is calculated as a weighted average across all industries.

¹Adjusted for productivity.

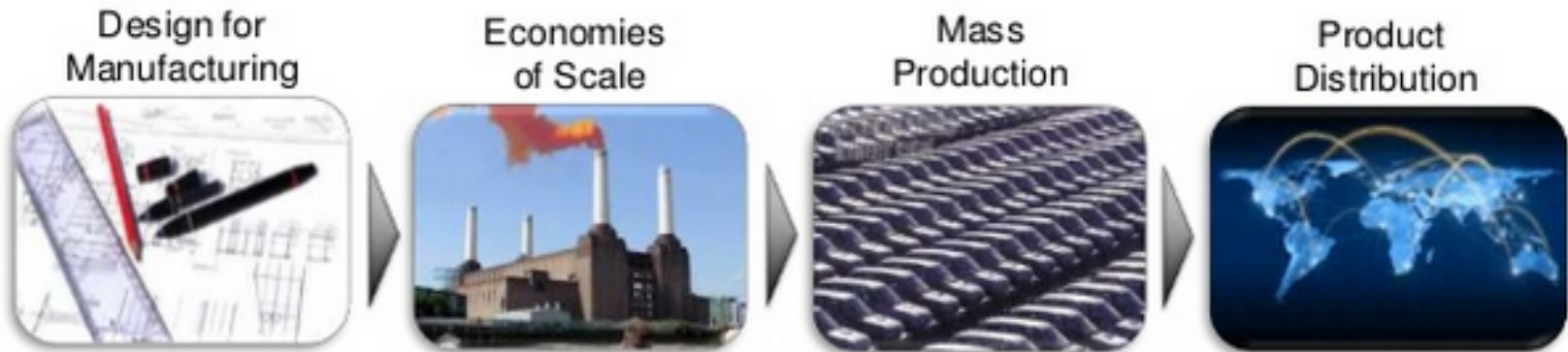
Global container trade flow 2010 vs 2030 (MN TEUs)



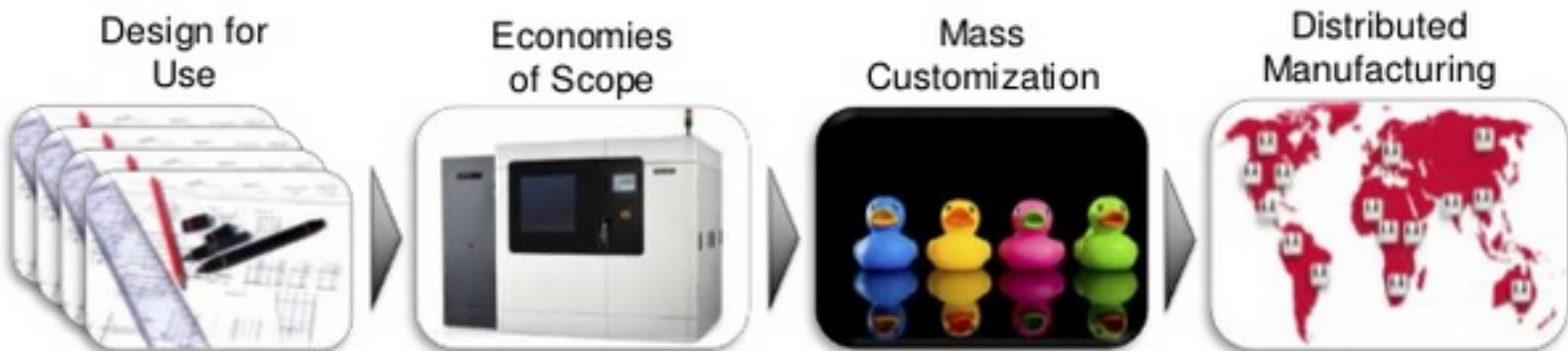
Source: Goldman Sachs Investment Research, 2011.

Trends in manufacturing

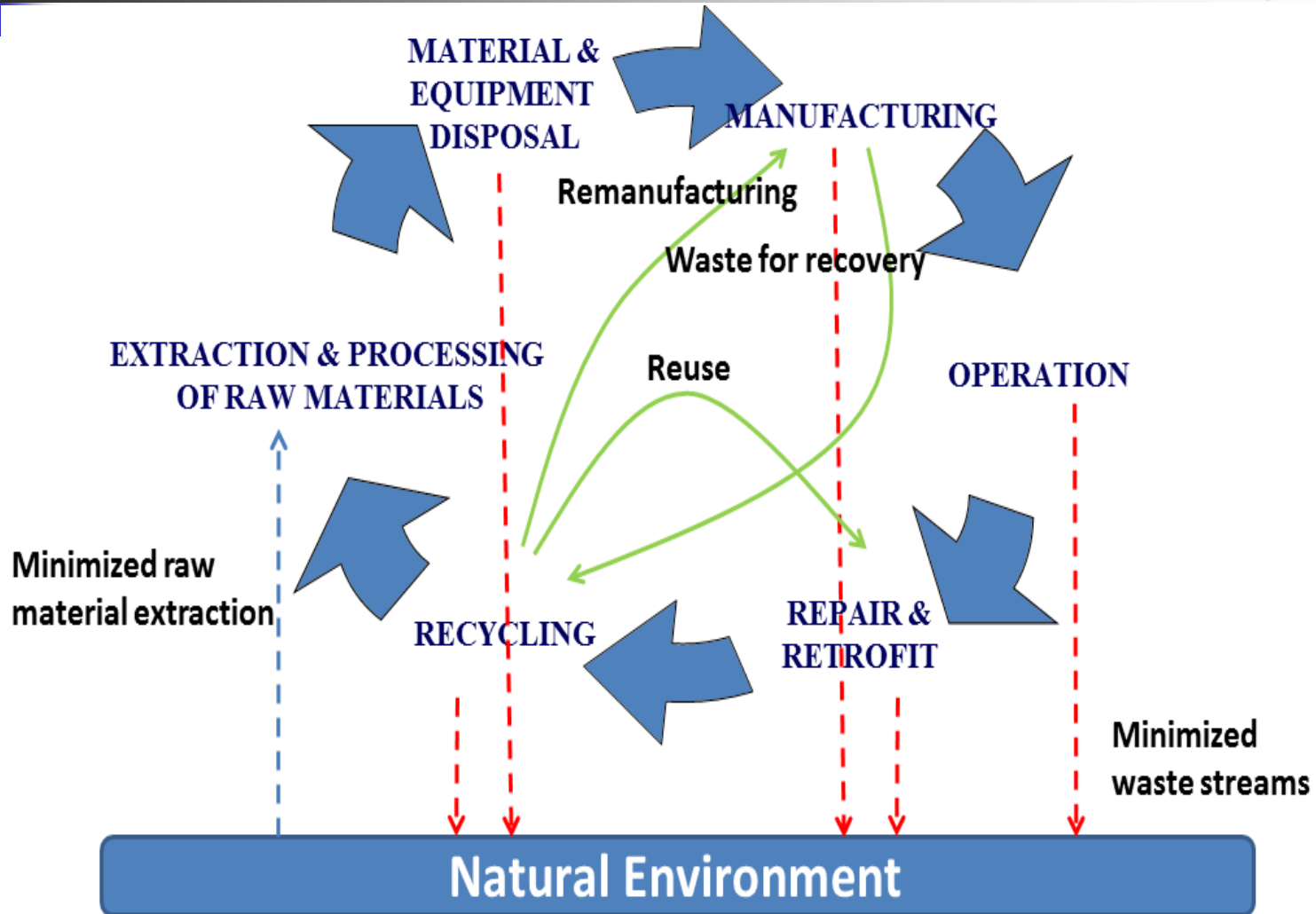
Current State :: Mass Production



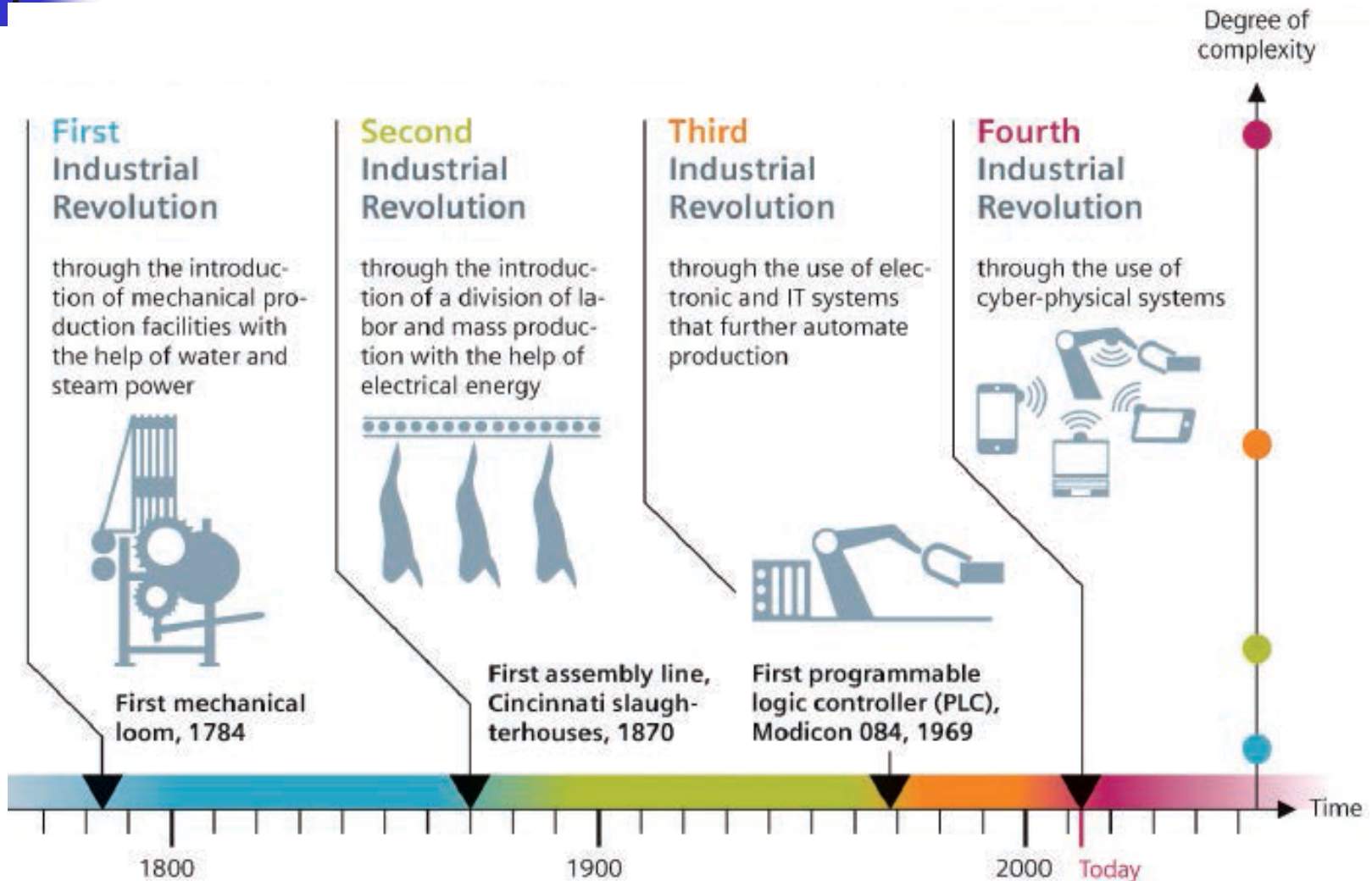
Emerging State :: Mass Customization



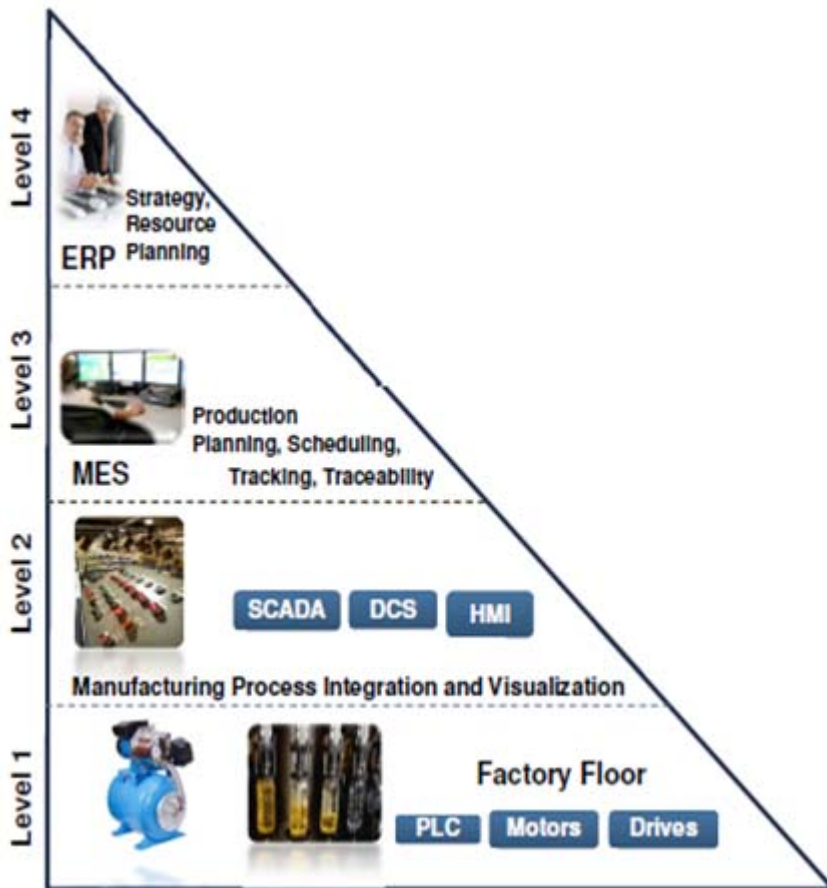
Closed loop manufacturing



The 4th industrial revolution

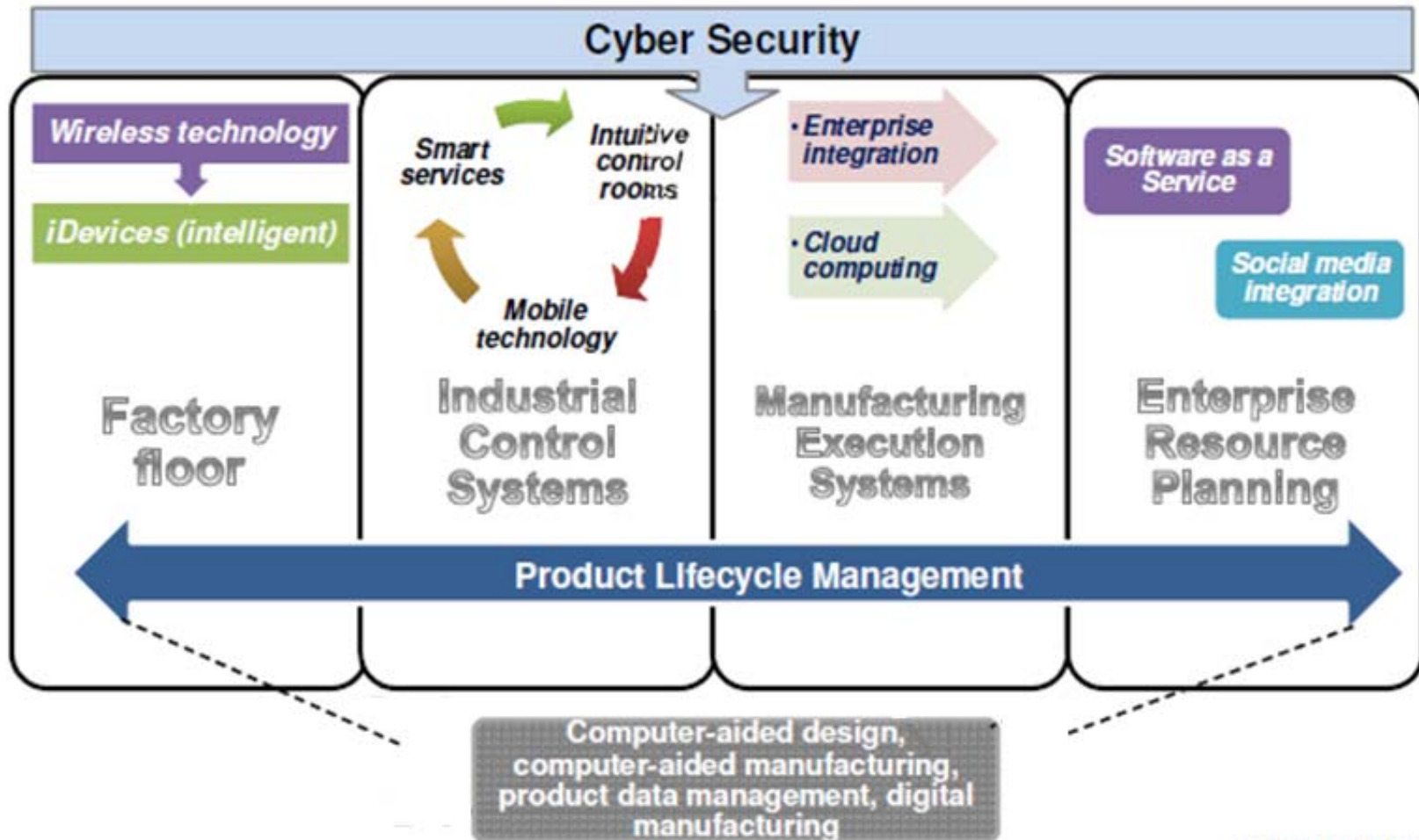


The Enterprise Pyramid



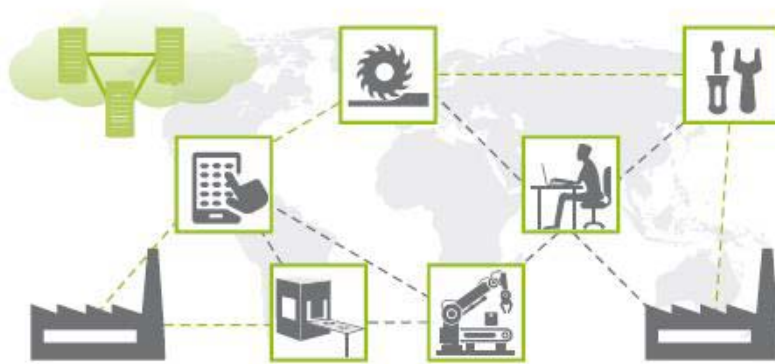
- The Enterprise Pyramid is a comprehensive representation of different operational layers at their respective positions.
- This includes factory floor at Level 1, followed by controls and automation in Level 2, MES at Level 3, and ERP at Level 4.
- In a new development, product life cycle management is expected to be included in the future of enterprise hierarchy, between Levels 3 and 4.

Integrated Enterprise Ecosystem



Main Characteristics

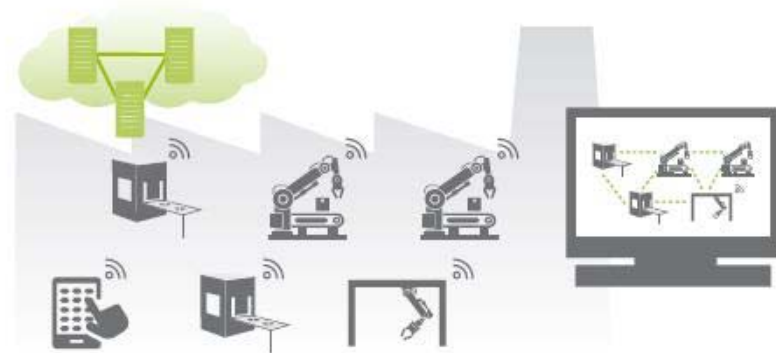
Horizontal integration across value networks



Digital consistency of the engineering across value chain



Vertical integration & networked production systems



Man as a conductor of the value



Overview of Digital Manufacturing Initiatives across Europe



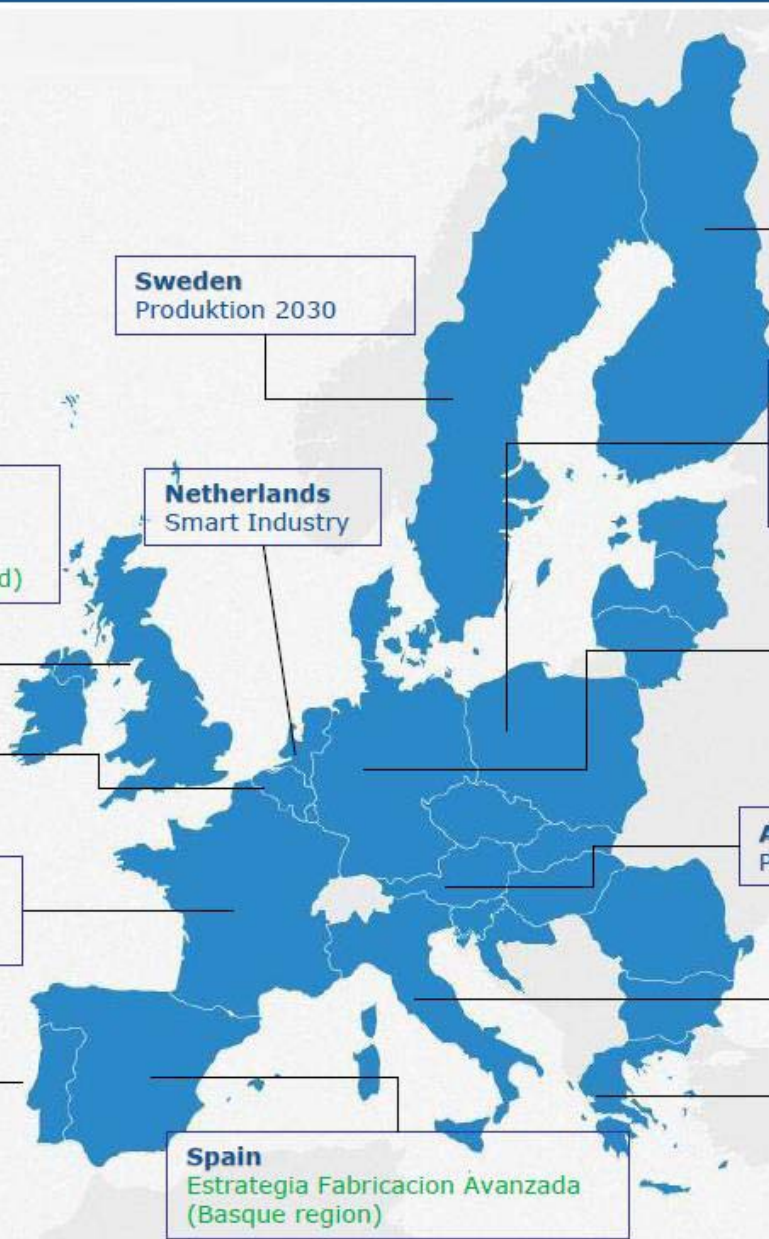
European Commission

EU-level Initiatives

- Application PPPs: FoF, SPIRE
- I4MS
- Smart Anything Everywhere
- ICT PPPs

Multi-region Initiatives

- Vanguard



Finland

- FIMECC PPP Programmes (MANU, S-STEP, SIMP, S4Fleet)
- Industrial Internet Business Revolution
- IoT pilot Factory (IoT PFF)

Poland

- INNOMOTO
- INNOLOT
- Digital manufacturing for the SME (Mazovia)

Germany

- Industrie 4,0
- Smart Service World
- Autonomik für Industrie 4.0
- It's OWL (Ostwestfalen-Lippe)
- Allianz Industrie 4.0 (Baden-Württemberg)

Austria

Produktion der Zukunft

Italy

- Fabbrica Intelligente
- Ass. Fabbr. Intell. Lombardia

Greece

Operational Programme in Region Western Greece

Sweden

Produktion 2030

Netherlands

Smart Industry

United Kingdom

- High Value Manufacturing
- Innovate UK
- Action Plan for Manufacturing (Scotland)

Belgium

- Made Different
- Flanders Make/iMinds (Flanders)

France

- Usine du Futur
- FoF Ile-de-France

Portugal

Produtech

Spain

Estrategia Fabricacion Avanzada (Basque region)

European initiatives are in red
National initiatives are in blue
Regional initiatives are in green



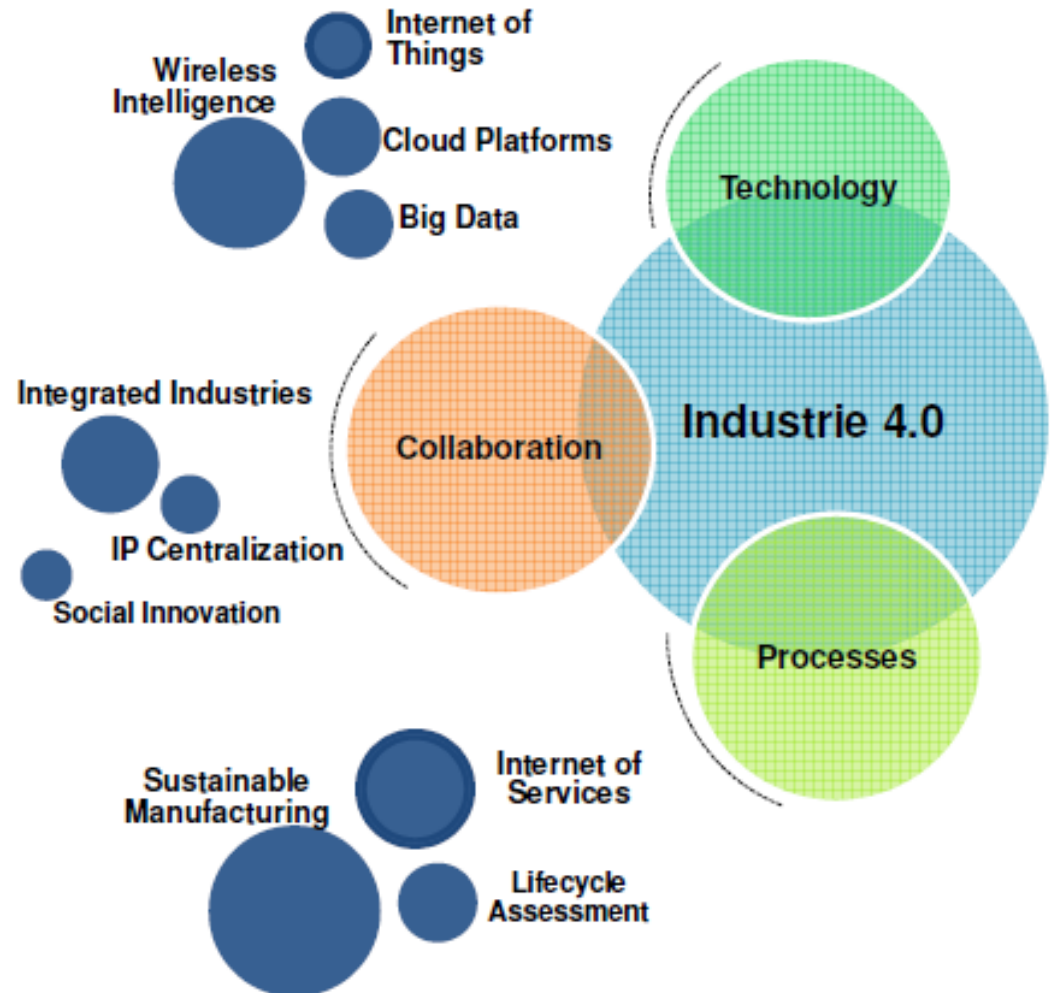
Project & Initiatives



Consequences and implications

Strategic trends

- Convergence of applications will form conditions of new advancements*
- Energy efficiency and sustainability to gain greater business focus*
- Greater presence of mobility and web-based information systems*





Critical factors

- Expert knowledge, flexibility, creativity and innovation;
- Convergence of production and interaction, work and communication are increasingly interdisciplinary competencies for staying economically competitive.
- For companies and businesses, however, these competencies do not just appear out of nowhere.

Our way of behaving



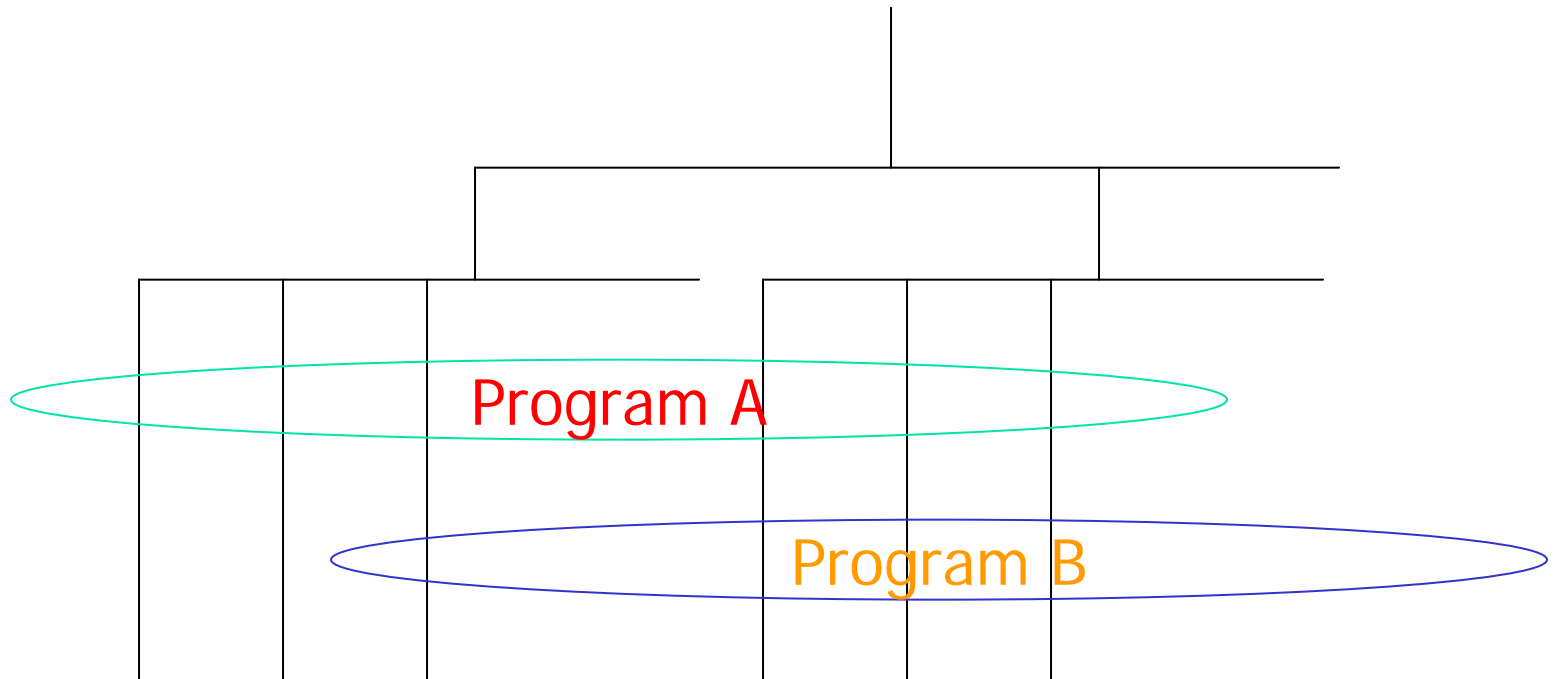


Intellectual Social Responsibility

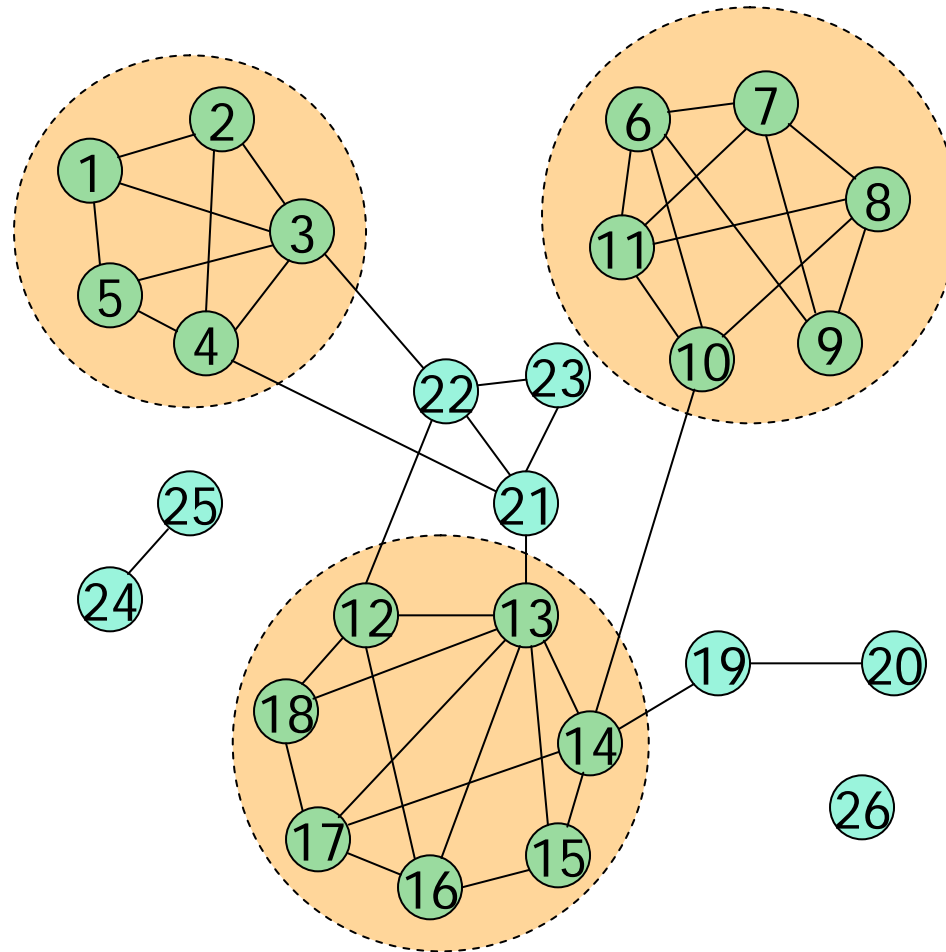
- Multivalent logic
- Synthetic thinking
- Integrative learning
- Focus on results
- Generate Synergies
- Team work
- Active involvement



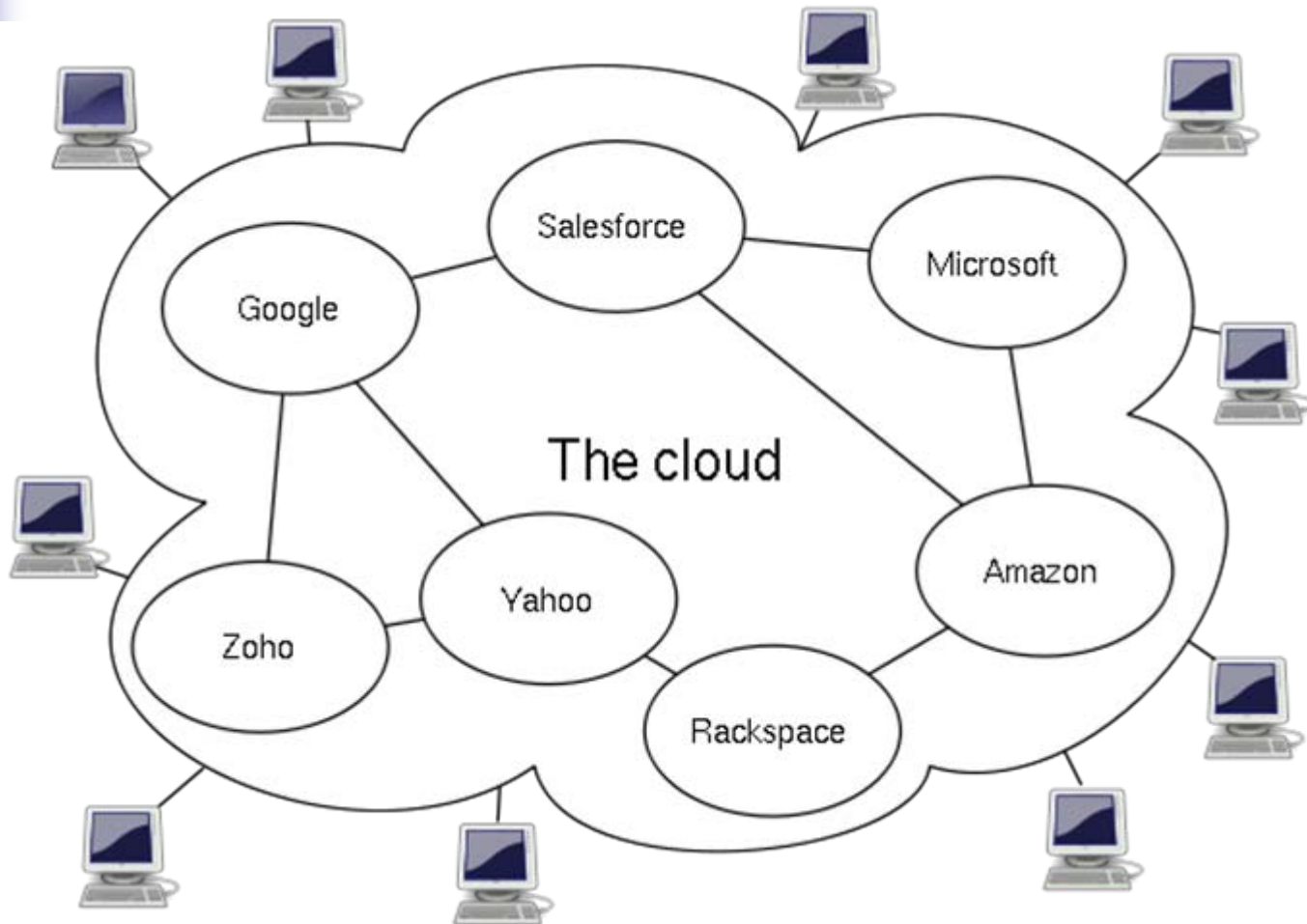
Matrix universities



Network of universities / Network university

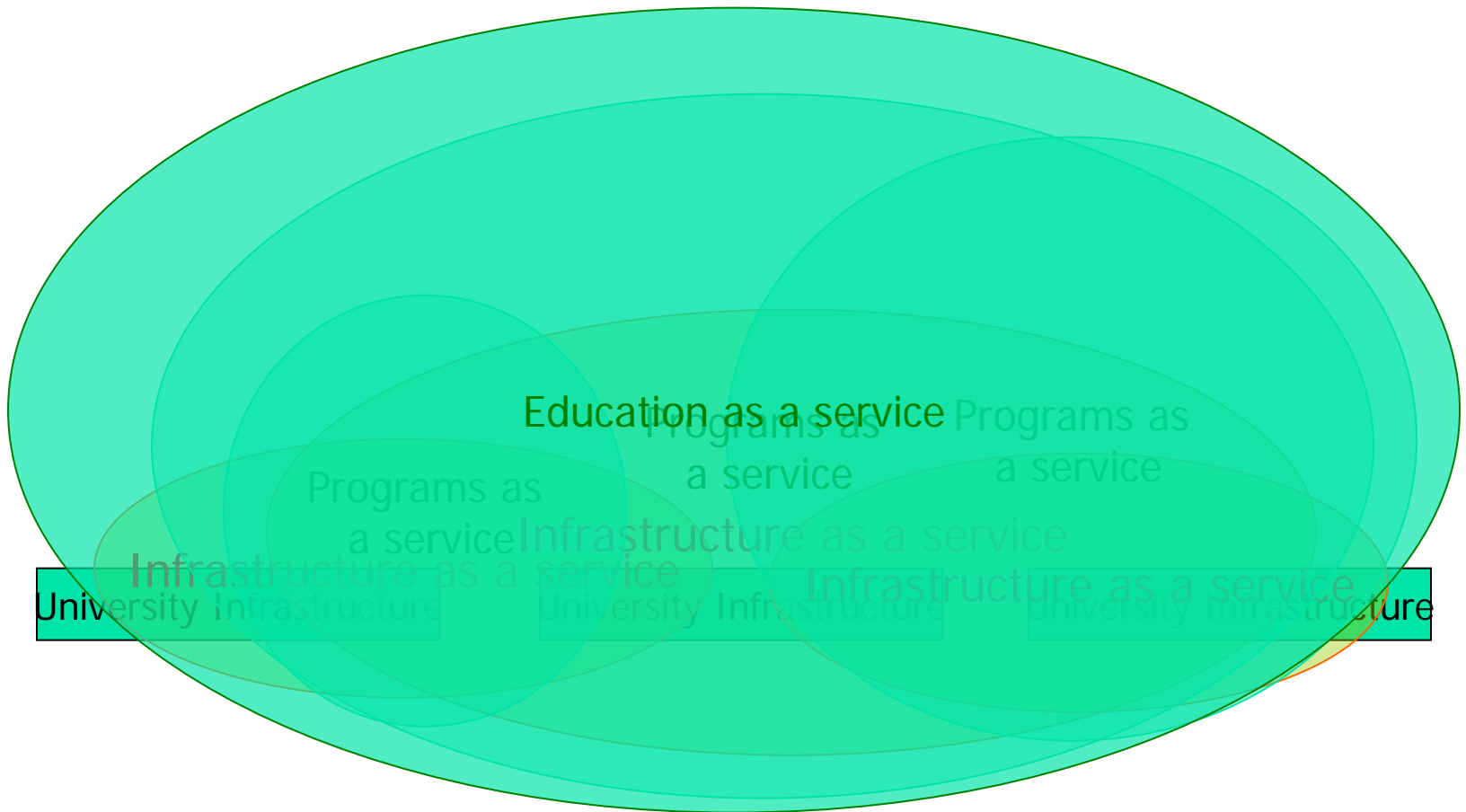


Cloud computing and





Cloud Universities





Black Sea Universities Network

- **Aim:** The Network was founded for the purpose of developing scientific, cultural and educational cooperation and exchanges among the Universities of the Black Sea Economic Cooperation Participating States and other institutions with similar concern for the sustainable development of the BSR
- **Members:** 120 Universities of 12 BSEC member countries
- **Bodies:** Conference of Rectors of BSR, Executive Board, President, IPS
- **Centers:** Center for Advanced Engineering Sciences (Romania), “B. S. Cobanzade” Research Center on Turkology, Baku State University, Center ACADEMICON (Turkey), Center for Coordination of Common Graduate Programs (Greece), Center for Coordination of Summer Schools & Short Term Certificate Courses (Ukraine), Center for Joint Research Projects (Azerbaijan), Center for BSUN Publications (Bulgaria),
- **Consortia:** BSUN Consortium on Economics & Business, Consortium on Oral Health, Consortium on Tourism, Consortium on RES.
- **Web site:** [Http://www.bsun.org](http://www.bsun.org)



UN Academic Impact

Academic Impact is a global initiative that aligns institutions of higher education with the United Nations in actively supporting ten universally accepted principles in the areas of human rights, literacy, sustainability and conflict resolution. The Academic Impact also asks each participating college or university to actively demonstrate support of at least one of those principles each year.

Principles:

1. A commitment to the principles inherent in the United Nations Charter as values that education seeks to promote and help fulfill;
2. A commitment to human rights, among them freedom of inquiry, opinion, and speech;
3. A commitment to educational opportunity for all people regardless of gender, race, religion or ethnicity;
4. A commitment to the opportunity for every interested individual to acquire the skills and knowledge necessary for the pursuit of higher education;
5. A commitment to building capacity in higher education systems across the world;
6. A commitment to encouraging global citizenship through education;
7. A commitment to advancing peace and conflict resolution through education;
8. A commitment to addressing issues of poverty through education;
9. A commitment to promoting sustainability through education;
10. A commitment to promoting inter-cultural dialogue and understanding, and the “unlearning” of intolerance, through education.

UNAI Hub on Sustainability

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United Nations Academic Impact Initiative



EVENTS

- [Sustainable Energy Day in Constantza \(2011-04-12\)](#)
- [International Conference on "Education & Governance for Sustainable Development" \(2011-03-16 ⇒ 2011-03-19\)](#)
- [CREATING A CULTURE OF INTELLECTUAL SOCIAL RESPONSIBILITY \(2011-03-15\)](#)

[more >>>](#)

NEWS

- [Research priorities on socio-economics aspects of the Danube River - Danube Delta - Black Sea region](#)
- [European Union Sustainable Energy Week 11-15 April 2011](#)
- [unai-sustainability.org website launch](#)

Academic Impact is a program of the Outreach Division of the Department of Public Information. It is open to all institutions of higher education granting degrees or their equivalent, as well as bodies whose substantive responsibilities relate to the conduct of research. Its essential frame of reference is:



UNITED NATIONS
**academic
impact**
IN ACTION

Sharing
a Culture
of Intellectual
Social
Responsibility



We Believe



SUSTAINABLE DEVELOPMENT



Sustainable Development: to meet the needs of the present without compromising the ability of the future generations to meet their own needs

Strategy Mix:

- efficiency – enhanced productivity / resource
- consistency – enhanced economies embedded in the natural cycles
- sufficiency – new concept of prosperity / satisfaction / material wealth

Management rules:

- the use of renewable natural resources must not exceed their regeneration rates
- the use of non-renewable natural resources must not exceed the rate of substituting their respective functions
- the emissions of pollutants must not exceed nature's capability to adapt

ECO-INNOVATION



The term environmental innovation, or shortly ‘eco-innovation’, relates to innovations aiming at a decreased negative influence of innovations on the natural environment.

Eco-innovation is “the creation of novel and competitively priced goods, processes, systems, services, and procedures designed to satisfy human needs and provide a better quality of life for everyone with a life-cycle minimal use of natural resources (materials including energy and surface area) per unit output, and a minimal release of toxic substances”.

GREEN ECONOMY

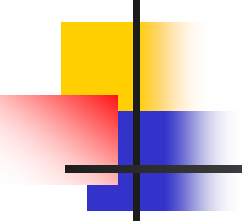


Improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities.

In its simplest expression, a green economy can be thought of as one which is low carbon, resource efficient and socially inclusive.

Practically speaking, a green economy is one whose growth in income and employment is driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services.

GREEN ECONOMY

- 
-
- Emphasis on renewable sources;
 - Minimal use of resources;
 - Minimal release of emissions on a Life Cycle approach;
 - Generation of new business opportunities;
 - Generation of sustainable new jobs.

HOLISTIC ENGINEERING

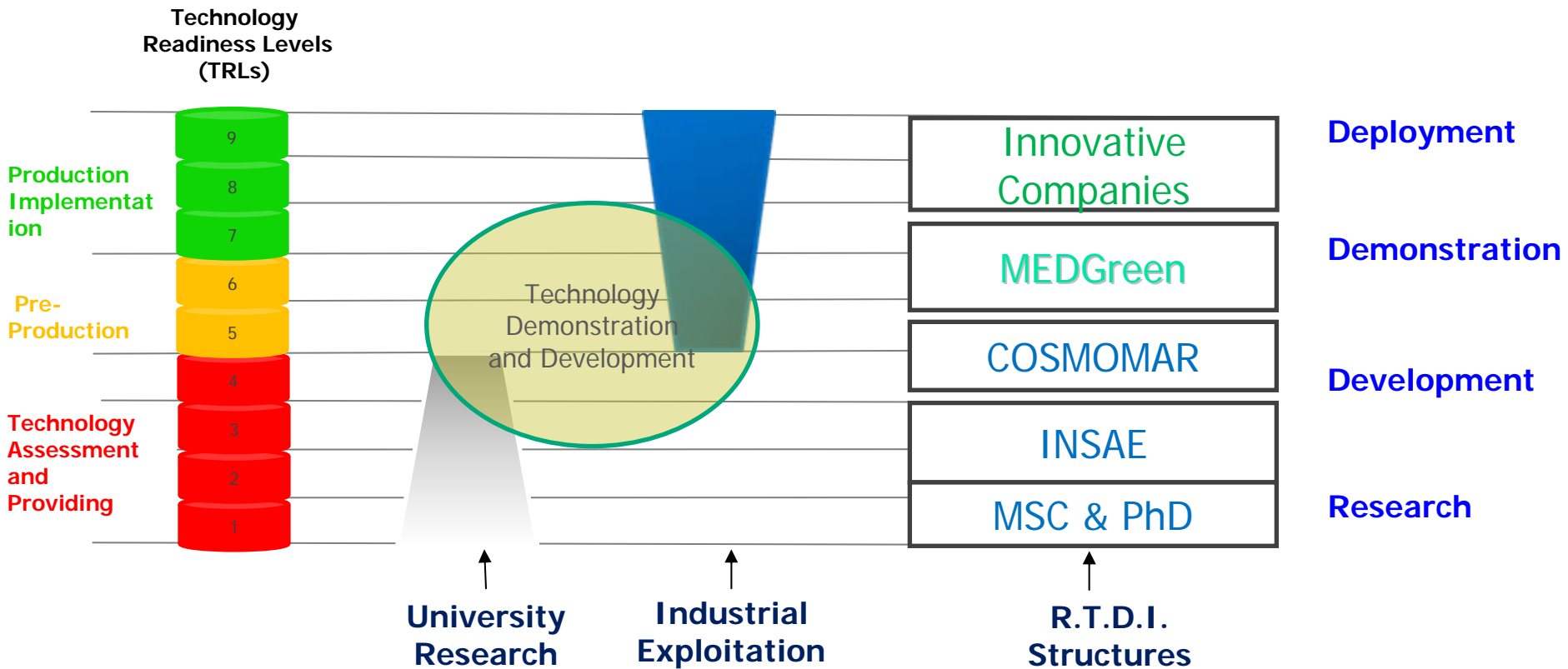


The classical definition of engineering: The application of scientific and mathematical principles to practical ends such as the design, manufacture, and operation of efficient and economical structures, machines, processes, and systems

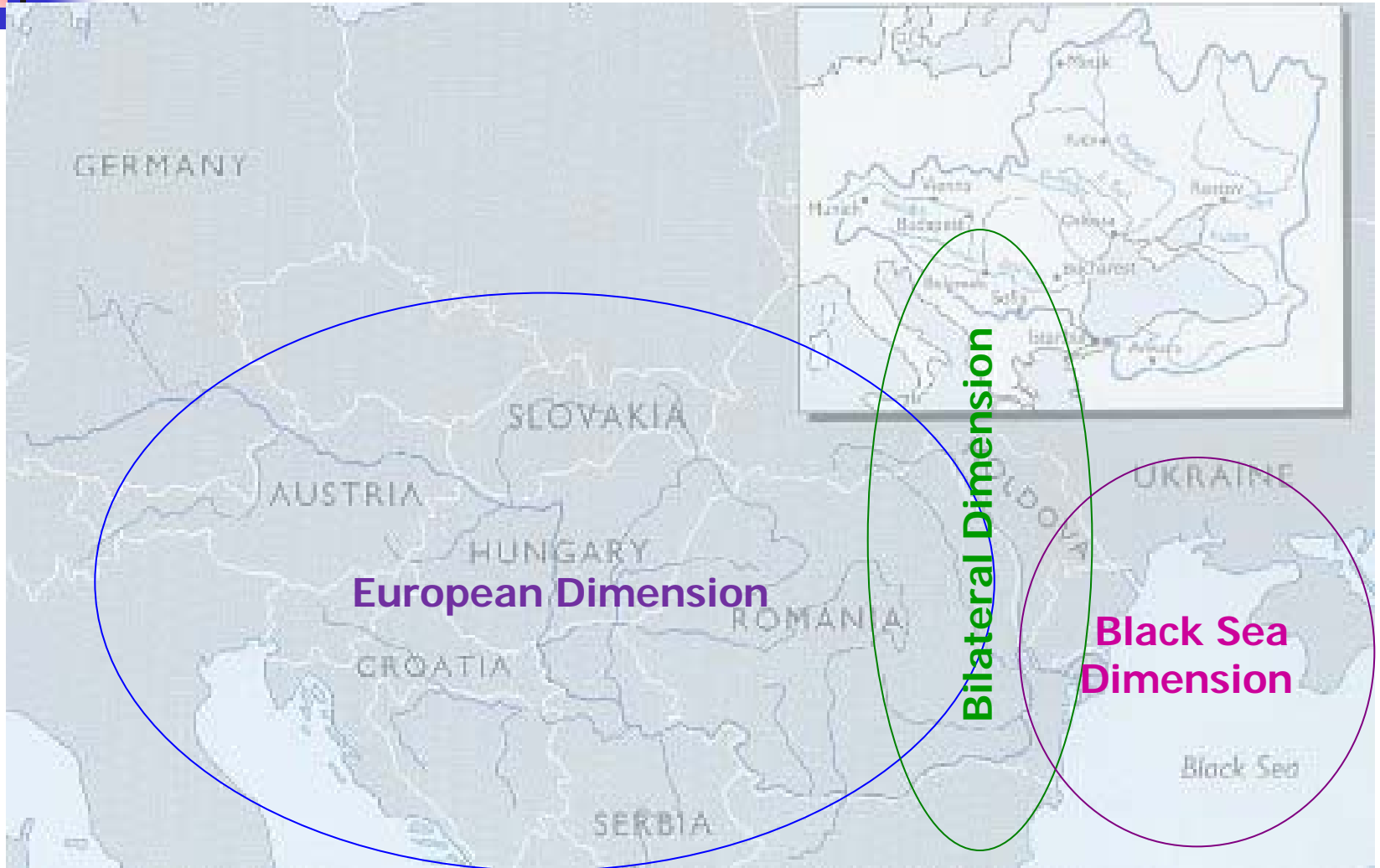
In the current context of the development of the mankind society complexity of the needs require to address them by emphasizing a more cross-disciplinary, whole-systems approach to engineering.

Holistic Engineering - the Art and Science of creating effective systems, using whole system, whole life principles.

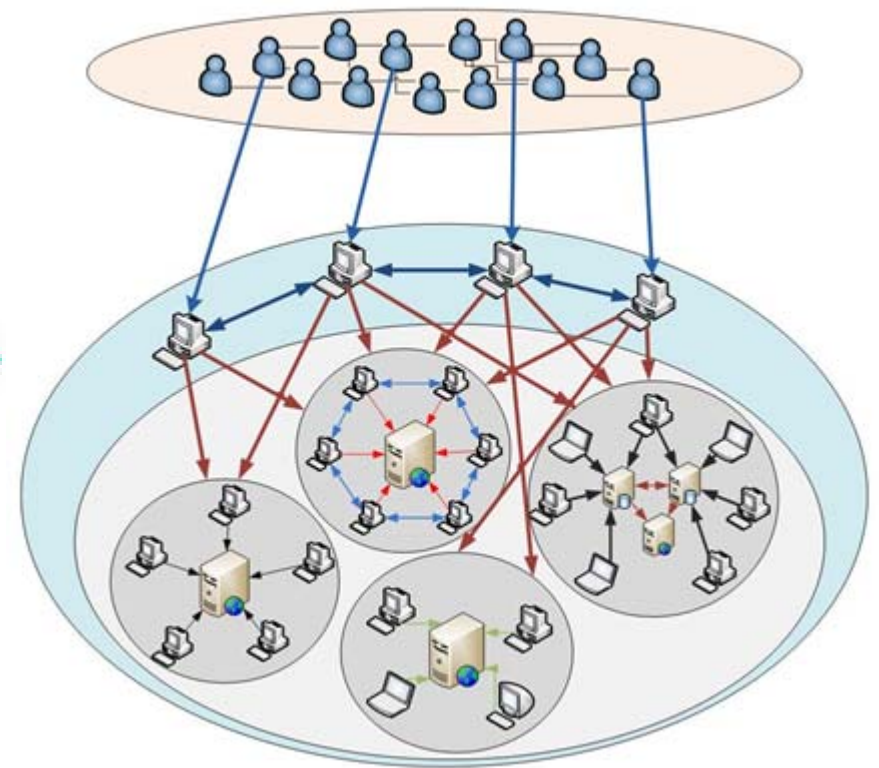
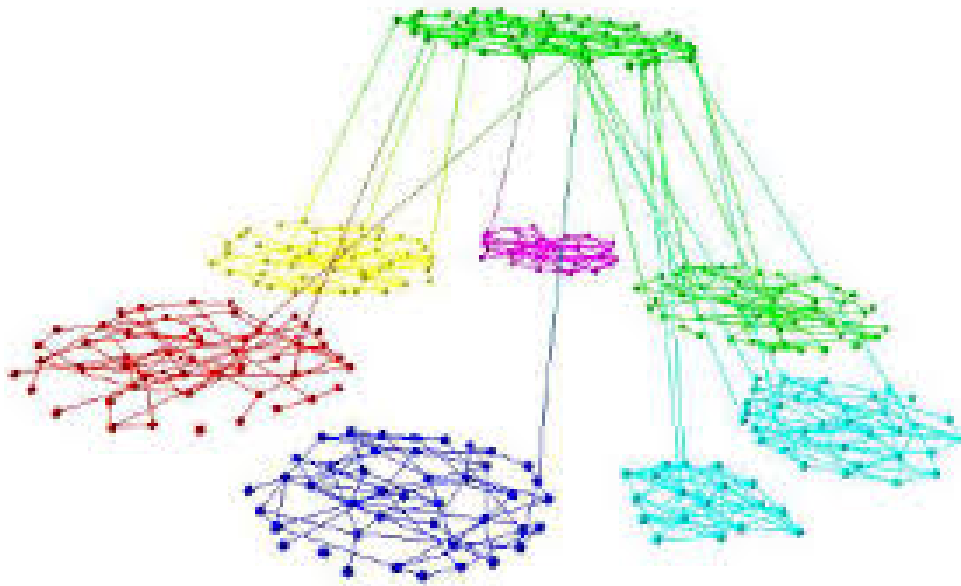
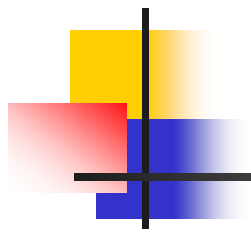
Implementing an ecoinnovation culture!



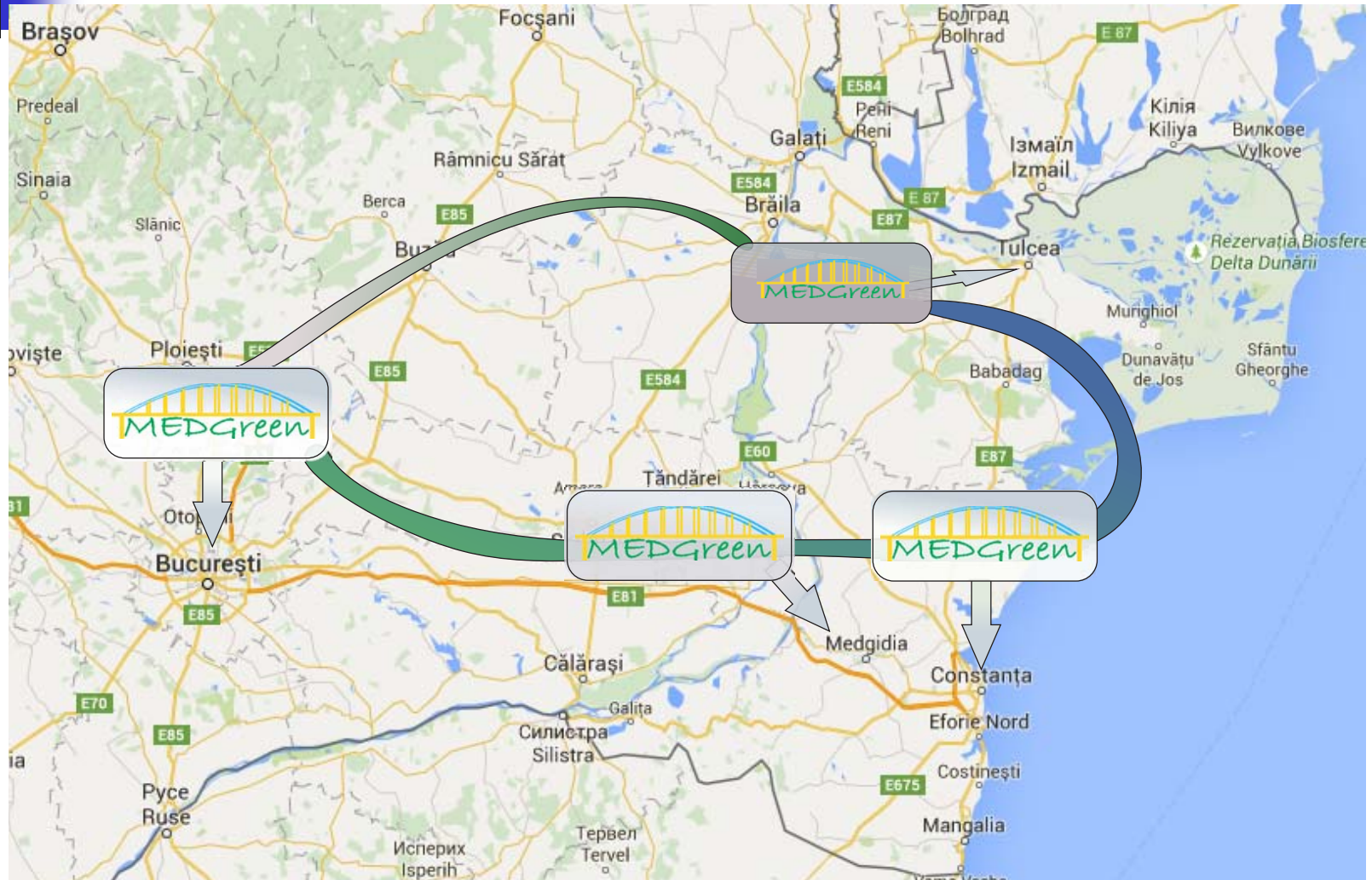
SCALES



CLUSTER STRUCTURES



Case study: Cluster MEDGreen





The MEDGreen Cluster

The MEDGreen Cluster is a cluster of innovative companies and stakeholders for promotion of eco-technologies and alternative sources of energy.

In 2012, it has been established a National Pole of Competitiveness on Green Economy involving the most relevant partners as companies, research organizations, universities and local authorities.

The grouping has been registered in 2013 as the Association MEDGreen-Innovative Cluster of companies specialized on ecotechnologies and alternative sources of energy.

The association has been granted with the financial support for the implementation of the project “The development of solutions innovative products and services that will enhance the competitive advantages of companies associated in the cluster MEDGreen”.

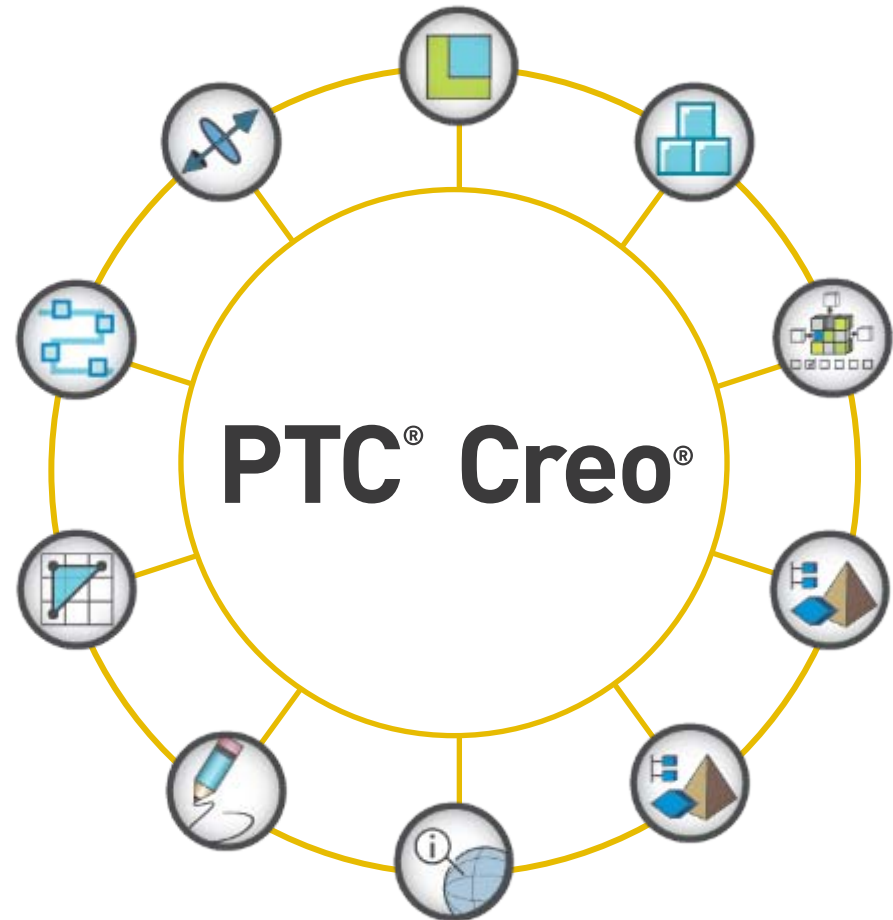
MEDGreen Cluster is collaborating with the other national and European associations specialized on the promotion of bio-energy on the Romanian and European market.



Design Framework

A usable suite of product design software

- Configurable user interface
- Quickly capture design intent:
Freestyle
- Make late stage design changes:
Flexible Modeling Extension
- One demand support:
PTC Learning Connector



Design Framework

The image displays a CAD software interface (Creo Parametric 2.0) with a 3D model of a cylinder. The model is orange and has a hexagonal hole. A dimension of 283.32 is shown on the top surface. The interface includes a menu bar (File, Model, Analysis, Annotate, Render, Tools, View, Flexible Modeling, Applications, Extrude), a toolbar, and a Model Tree on the left. The Model Tree shows the following structure:

- PRT0001.PRT
 - RIGHT
 - TOP
 - FRONT
 - PRT_CSYS_DEF
 - Sketch 1
 - Insert Here
 - Extrude 1

Three green arrows point from the 3D model to the LearningConnector window on the right:

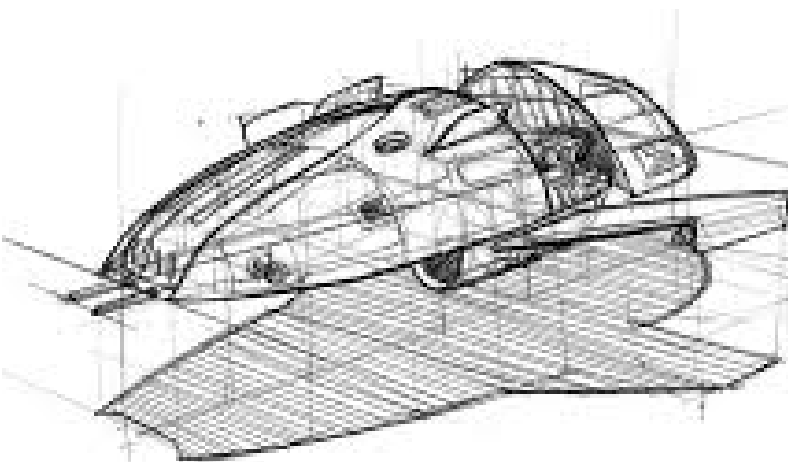
- Video Tutorials**: Points to the video player showing a hexagonal sketch.
- eLearning Topics**: Points to the list of recommended topics.
- Help Center**: Points to the Knowledge Base section.

The LearningConnector window displays the following content:

- Extrude - Solid**
- Tutorial**: A video player showing a hexagonal sketch.
- Recommended topics**:
 - Automatically Adding and Removing Material (Introduction to Creo Parametric 2.0 - Fundamentals)
 - Common Dashboard Options: Extrude Depth (Introduction to Creo Parametric 2.0 - Fundamentals)
 - Common Dashboard Options: Feature Direction (Introduction to Creo Parametric 2.0 - Fundamentals)
 - Common Dashboard Options: Thicken Sketch (Introduction to Creo Parametric 2.0 - Fundamentals)
 - Creating Solid Extrude Features (Introduction to Creo Parametric 2.0 - Fundamentals)
- Help Center**:
 - Knowledge Base



Design Framework



PTC® Creo®

Draw



PTC Creo Sketch

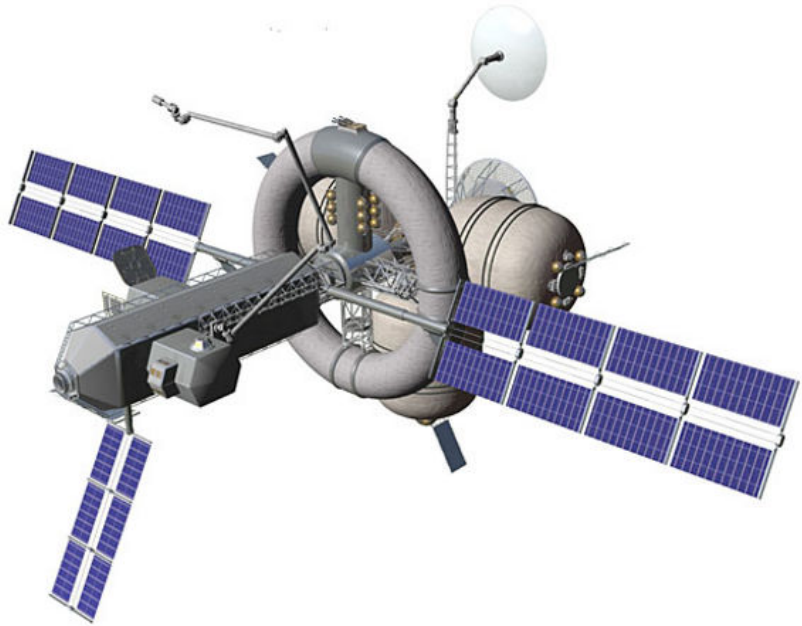


PTC Creo Schematics





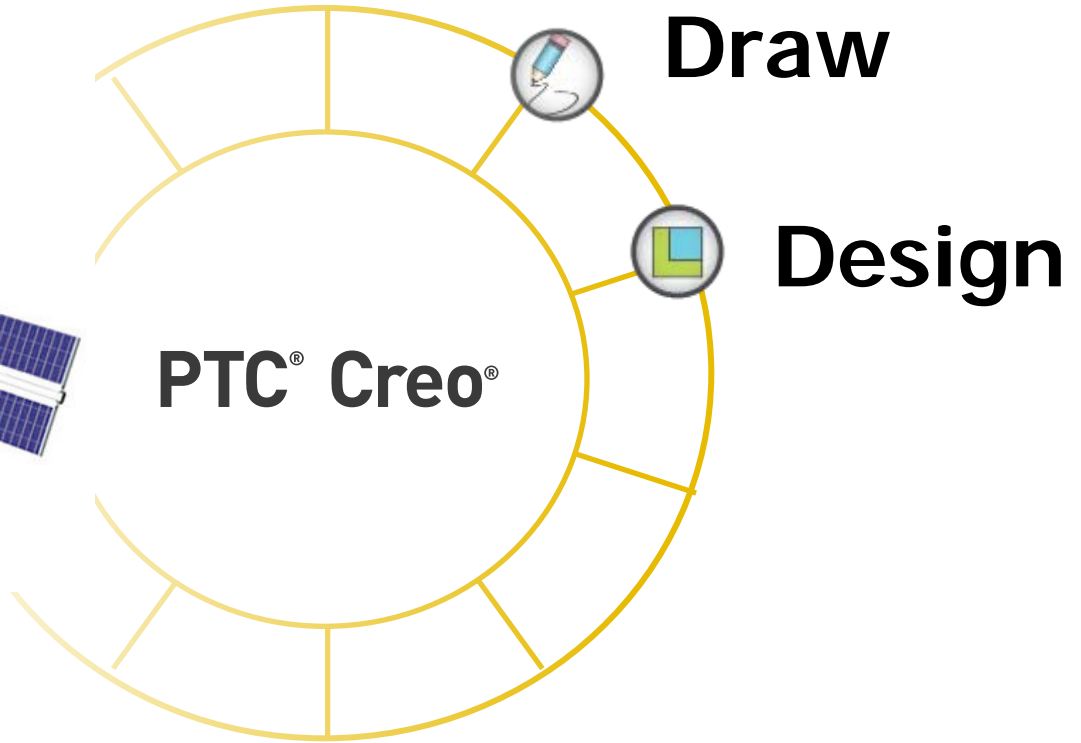
Design Framework



PTC Creo Parametric

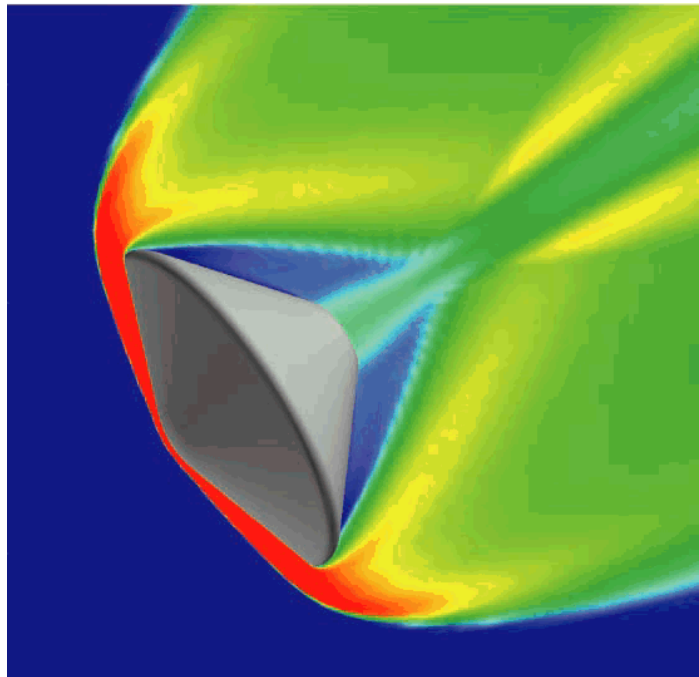


PTC Creo Direct

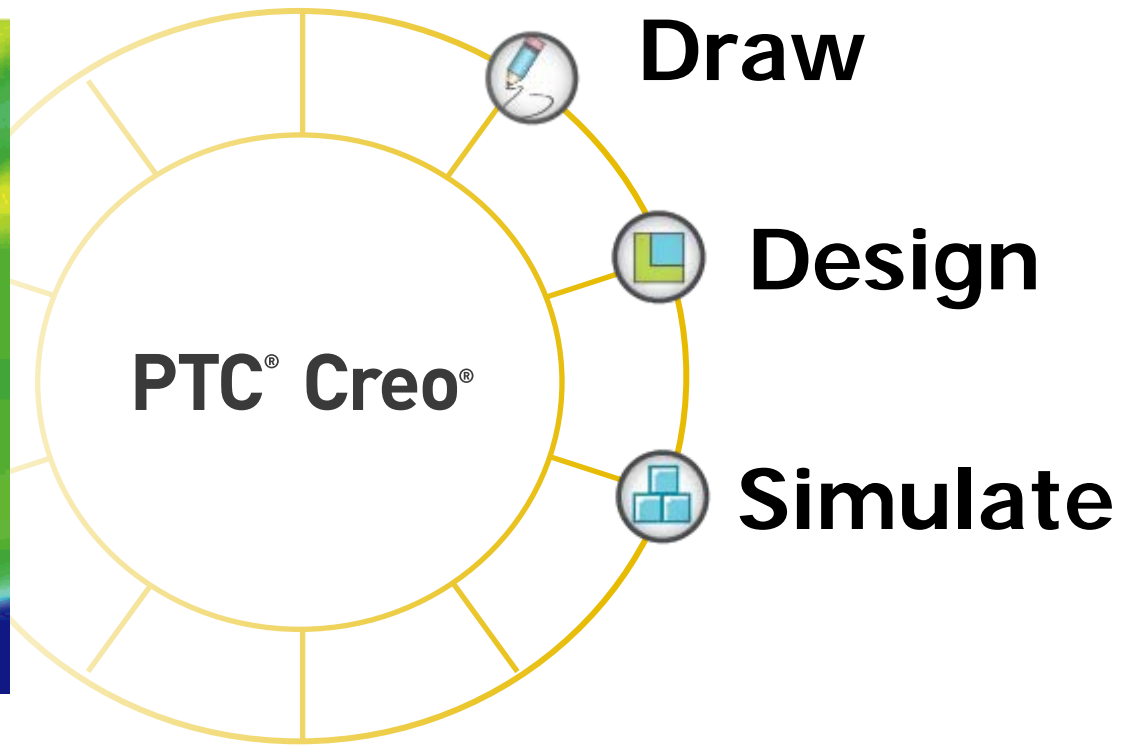




Design Framework



PTC Creo Simulate





Design Framework



PTC® Creo®



Draw



Design



Simulate



Manufacture

PTC Creo Parametric



Smart, connected products, products systems and other Things connected through Internet-like communication infrastructure to a computing infrastructure that are changing the world.



Smart, Connected Product

Connected through a wire or wireless

Many to Many

One to Many

One to One



Smart Product

Enhanced UI
Ability to Interact

Software
Ability to Think

Sensors
Ability to Sense

Electronics and Controls
Ability to Process



Physical Product

Electrical

Mechanical





The Internet of Things Changes Business Models

	Definition	Traditional	IoT
Value Creation	Activities that increase the value of a company's offerings	Solve for existing needs in a reactive manner	Address needs in real time and predict future needs
Value Capture	How to get people to pay for what a company offers	Sell the product or device	Enable recurring revenue

ThingWorx – Complete & Designed for Purpose

Dynamic Applications



MASHUP BUILDER

SQUEAL

3RD PARTY TOOLS

ThingWorx Rapid Application Dev. Platform

REST APIs



SYSTEM SERVICE INTEGRATION



BUSINESS LOGIC
Properties/Services/Events



3D STORAGE ENGINE

COMMUNICATIONS AlwaysOn™, REST, API, MQTT, Sockets, etc.

ThingWorx™
A PTC Business

The Network

Sensors, Devices & Equip.



Applications in Manufacturing



Applications in Oil & Gas

The image displays two screenshots of the ThingWorx 'Acme Oil & Gas' application interface. The top screenshot shows a dashboard with a map of San Antonio, a left-hand navigation tree, and a 'DG-Alerts' table. The bottom screenshot shows a zoomed-in map view with a red location pin and a cyan circular alert zone.

Top Screenshot: Dashboard Overview

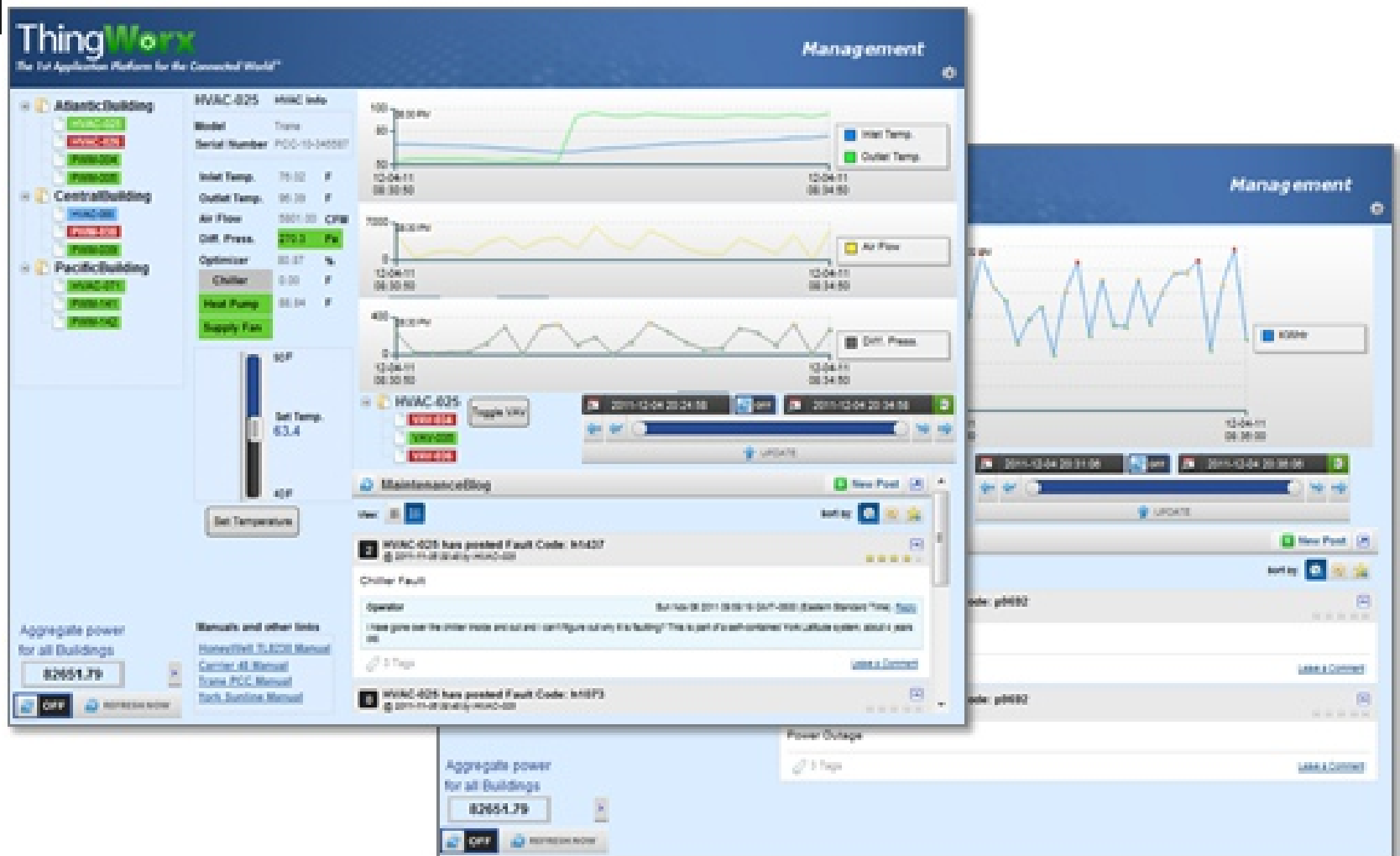
- Header:** ThingWorx logo, 'Acme Oil & Gas', and a search bar.
- Left Panel:** A navigation tree showing a hierarchy of assets: 'Acme Oil & Gas' (parent), 'Production' (child), 'Center Unit 1' (child), 'Wellman 1' (child), 'Bunker Unit 1' (child), 'East Longhorn Facility' (child), 'North Star' (child), and 'Bunker' (child).
- Main Map:** A map of San Antonio, Texas, with several green circular markers indicating asset locations.
- Bottom Left Panel:** A 'DG-Alerts' table with columns for 'Alert', 'Status', and 'Action'.

Alert	Status	Action
DOT Valve Inspection	Completed	View
Outage at Compressor Site	Warning	View
API Failure on Well 21004	Warning	View
High Tank Level	Warning	View
High H2S Alarm	Warning	View
- Bottom Right Panel:** A 'Station Point' list with entries for 'Center Unit 1', 'Wellman 1', 'Bunker Unit 1', and 'East Longhorn Facility'.

Bottom Screenshot: Map View

- Header:** ThingWorx logo, 'Acme Oil & Gas', and a search bar.
- Main Map:** A zoomed-in map view showing a red location pin and a cyan circular alert zone centered on the pin.
- Bottom Panel:** A 'Find Assets' section with buttons for 'Find Assets' and 'Find Assets & Post'.

Smart Grids / Energy



Applications in M2M

The image displays five overlapping screenshots of the ThingWorx 'Acme Beverage' application interface, illustrating various M2M (Machine-to-Machine) capabilities. The interface is designed for monitoring and managing vending machines and associated sales data.

- Top Screenshot:** Shows a 'Global Dashboard' with a map of Philadelphia, PA, and four gauges for 'Sales vs Goal', 'Service %', 'Prod DTY', and 'Complaints'.
- Second Screenshot (Left):** Displays an 'Operations Overview' with a video feed of a vending machine and a 'Tag Cloud of Complaints'.
- Third Screenshot (Center):** Focuses on a 'Vending Machine' (VM-003) with an 'Operational Status' section showing product levels (e.g., Soda, Juice, Water) and two gauges for 'Temperature' and 'Humidity'.
- Bottom Screenshot (Right):** Shows a 'Sales & Marketing Overview' with a bar chart for 'Sales by Product (1000's)' and a pie chart for 'Sales by Site (1000's)', along with four gauges for 'Prod & Sales' and 'Dynamics & Sales'.
- Bottom Screenshot (Left):** Features a 'Community Members' list and an 'Operations Collaboration' section.

The interface consistently uses the ThingWorx logo and the tagline 'The IoT Application Platform for the Connected World™'. The 'Acme Beverage' branding is prominent in the top right of each screenshot.

Complex Machinery

The dashboard displays the following components:

- Global Operations View:** A map of the United States with a sidebar listing sites: Australia (Metropolitan, North Goonyella), United States (Fossil Creek Mine, Flamingo, Gateway).
- Summary Table:**

Site	Production	Operator Hours	Productivity	Accidents	Incident Rate
Metropolitan	150000	201118	5.21	7	4.85
- Equipment Manifest and Status:**

Name	Last Maintenance	Status	Manufacturer	Model	Type	Run/Time Hours
CAT-125-001	2011-07-15	Online	Caterpillar	CAT125	Truck	1463
CAT-973000-001	2011-10-21	Online	Caterpillar	973000	Truck	5640
CAT-973000-002	2011-06-15	Online	Caterpillar	973000	Truck	2140
CAT-973000-003	2011-07-09	Online	Caterpillar	973000	Truck	9632
J0Y-12M627-001	2011-02-21	Online	Joy Mining	12M627	Continuous Miner	1402
J0Y-12M627-001	2010-11-22	Offline	Joy Mining	12M627	Continuous Miner	8716
- Operator Log:**
 - Joy miner failure** (2011-11-28 08:34 by Operator): Our 12M627 Continuous Miner has had several Thermal Overload faults today. Unit has been taken out of service and a Maintenance request has been issued.
 - Safety issue** (2011-11-28 08:34 by Operator): Lots of vibration in initial cut. Noticed output lubrication from previous shift.
 - Joy miner failure** (2011-11-27 08:34 by Operator):
- Maintenance Work Orders:**

ID	EquipmentID	DateOpened	Description	Status	Priority
PE12243	J0Y-12M627-001	2011-11-18	Thermal Overload Trip of Pump Motor	CLOSED	High
PE17151	J0Y-12M627-001	2011-11-23	Cutter Thermal Shutdown	CLOSED	High
PE18626	J0Y-12M627-001	2011-11-05	Cutter Thermal Shutdown	CLOSED	High
PE31670	J0Y-12M627-001	2011-11-09	Pump Error	OPEN	High
- Monthly Trending Report:** A bar chart showing production (blue), operator hours (green), and productivity (red) from Jan to Oct.
- Daily Production Data:** A line chart showing production (blue), operator hours (green), and productivity (red) from Oct 10, 2011 to Feb 20, 2012.

Applications in Medical Devices

The screenshot displays the ACME+MEDICAL ThingWorx dashboard. The interface is divided into several sections:

- Header:** Includes the ACME+MEDICAL logo, the ThingWorx logo, and a user selection dropdown set to "Call Center Specialist".
- Navigation:** A top bar with tabs for "Home", "Activities", "Customers", "Equipment", "Leads", and "SUDA".
- Left Sidebar:** Contains three main buttons: "Create New Service Ticket" (with a wrench icon), "Create New Workorder" (with a document icon), and "Create New Sales Opportunity" (with a star icon). Below these is a "Upcoming Maintenance" calendar for November 2012, showing a grid of dates with a "1" in the 1st and "2" in the 2nd.
- Main Content Area:**
 - Recent Notifications:** A table with columns for "Message", "Action", "Timestamp/Origin/Notification", and "Priority". It lists two notifications: "Machine Generated Fault - Error Code 10 - Sample not seen" (Action: Stop, Priority: 3.00) and "MIT Device Shipment 1802 - Serial #8871788 ready for shipping to Biobabco" (Action: Stop, Priority: 3.00).
 - Map:** A Google Maps view showing a geographical area with a red location pin.
 - Service Tickets:** A section titled "Open Service Tickets" with a sub-section "Select an Ticket Below First" listing tickets for "AFIndyMolecularResearch".
 - Reports Statistics:** A "Device History Log" table with columns for "Date", "User", "Type", "Status", "Device", and "Description". It lists several test records. To the right is an "Activities for Site" table with columns for "Timestamp", "User", "ID", "Description", and "Status".
 - Device Data:** A "Device Settings" section featuring a gauge for "TND" and a line graph showing data trends over time.
 - Additional Gauges:** A "Flow Speed (G/L)" gauge and a "Tank Size Last 6H" bar chart.

Applications in Transportation

The screenshot displays the ACME+MEDICAL ThingWorx dashboard, which is a comprehensive monitoring and service management interface. The dashboard is organized into several key sections:

- Navigation and User Interface:** The top bar includes the company logo, user selection options, and navigation tabs for Home, Activities, Customers, Equipment, and Tools. A sidebar on the left provides quick access to 'Create New Service Ticket', 'Create New Workorder', and 'Create New Sales Opportunity'.
- Recent Notifications:** A table displays the most recent alerts, including machine faults and shipment status updates.
- Map and Location Services:** A central map shows the current location of the selected customer, with a sidebar for 'Open Service Tickets' and a 'Select an Ticket Below First' dropdown.
- Diagnostic and Performance Data:** The right side features a 'Diagnosis Statistics' section with a 'Service History Log' table and an 'Addition for this' table. Below this, there are 'Active Settings' gauges and a line graph showing performance trends over time.
- Service Alerts and Maintenance:** A 'November 2012 Upcoming Maintenance' calendar is visible on the left, and a '5/13/2011 Affinity' alert is shown at the bottom left.

Message	Action/ID	Timestamp/Original Notification	Priority
Machine Generated Fault - Error Code 10 - Sample not seen	1000	2012-09-18 12:53:29	3.00
MBT Device Shipment 1802 - Serial #MBT 7688 ready for shipping to Biotech	2000	2012-09-17 13:10:21	3.00

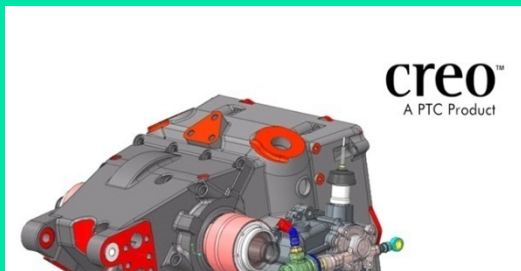
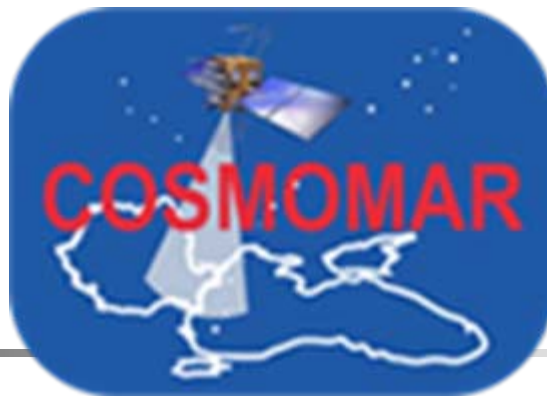
Date	User	Type	Source	Area & Title
2012-09-18 09:10	MBT-001	Alert	MBT-001	Gas/MSA-T006 Command Error
2012-09-07 09:10	MBT-001	Info	MBT-001	Test Record from MBT-001
2012-09-06 09:10	MBT-001	Info	MBT-001	Test Record from MBT-001
2012-09-06 09:10	MBT-001	Error	MBT-001	Auto-generated Fault - Service 0
2012-09-06 09:10	MBT-001	Warning	MBT-001	Diagnostic Command Evaluation
2012-09-01 23:10	MBT-001	Info	MBT-001	Test Record from MBT-001
2012-09-01 23:10	MBT-001	Warning	MBT-001	Diagnostic Command Evaluation
2012-09-01 23:10	MBT-001	Info	MBT-001	Test Record from MBT-001

Timestamp	Area	Value	Description	Status
11:00 11:01	Open	0	Injection Software	
10:51 09:47	Open	0		
10:51 09:47	Open	0		
10:51 14:30	Open	0	Health suggests	unset
10:50 11:00	Open	0	Out of support	unset
10:21 16:40	Open	0		
10:21 16:40	Open	0		
10:21 16:40	Open	0		
10:19 12:07	Open	0	Device unloading	unset

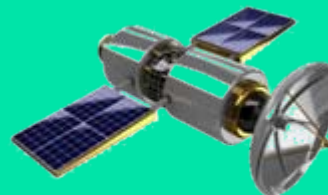


Space Research





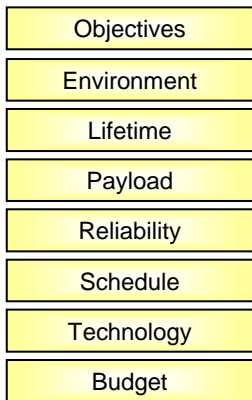
Application Layer



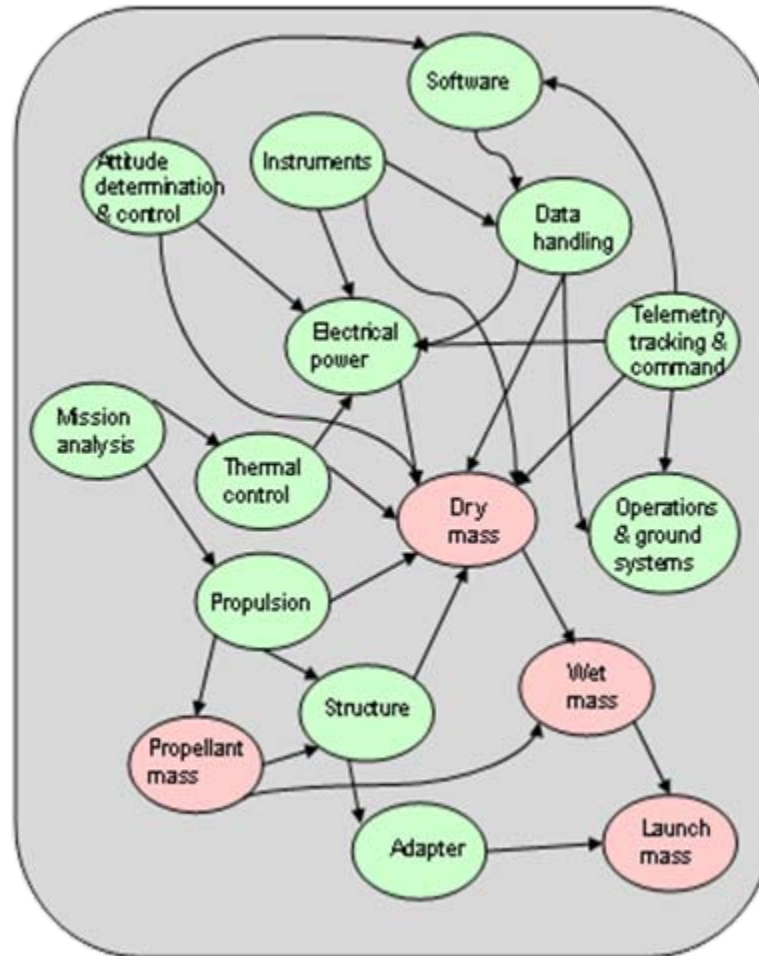
Infrastructure Layer

Concurrent Design Process Flow

Mission requirements & constraints



Study requirements



Study results



Conceptual model of mission & spacecraft design process

17 Concurrent Design Centres in European Space Sector

United Kingdom

- CDF at **Univ. of Strathclyde**, Glasgow
- SDO at **EADS/Astrium**, Stevenage
- CDF at **Univ. of Southampton**, Southampton
- CDF at **Harwell Institute**, Oxford

The Netherlands

- CDF at **ESA/ESTEC**, Noordwijk

Germany

- CEF at **DLR**, Bremen
- SDO at **EADS/Astrium**, Friedrichshafen

France

- CDF at **ISU**, Strasbourg
- PASO at **CNES**, Toulouse
- SDO at **EADS/Astrium**, Toulouse
- CDF at **Thales Alenia Space**, Cannes

Switzerland

- CDF at **EPFL**, Lausanne

Portugal

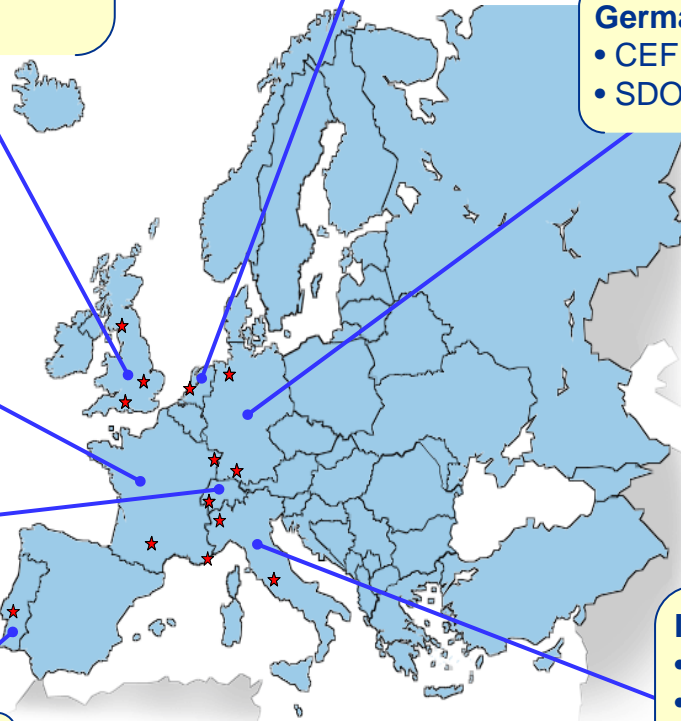
- CDF at **Univ. Técnica de Lisboa**, Lisbon

Italy

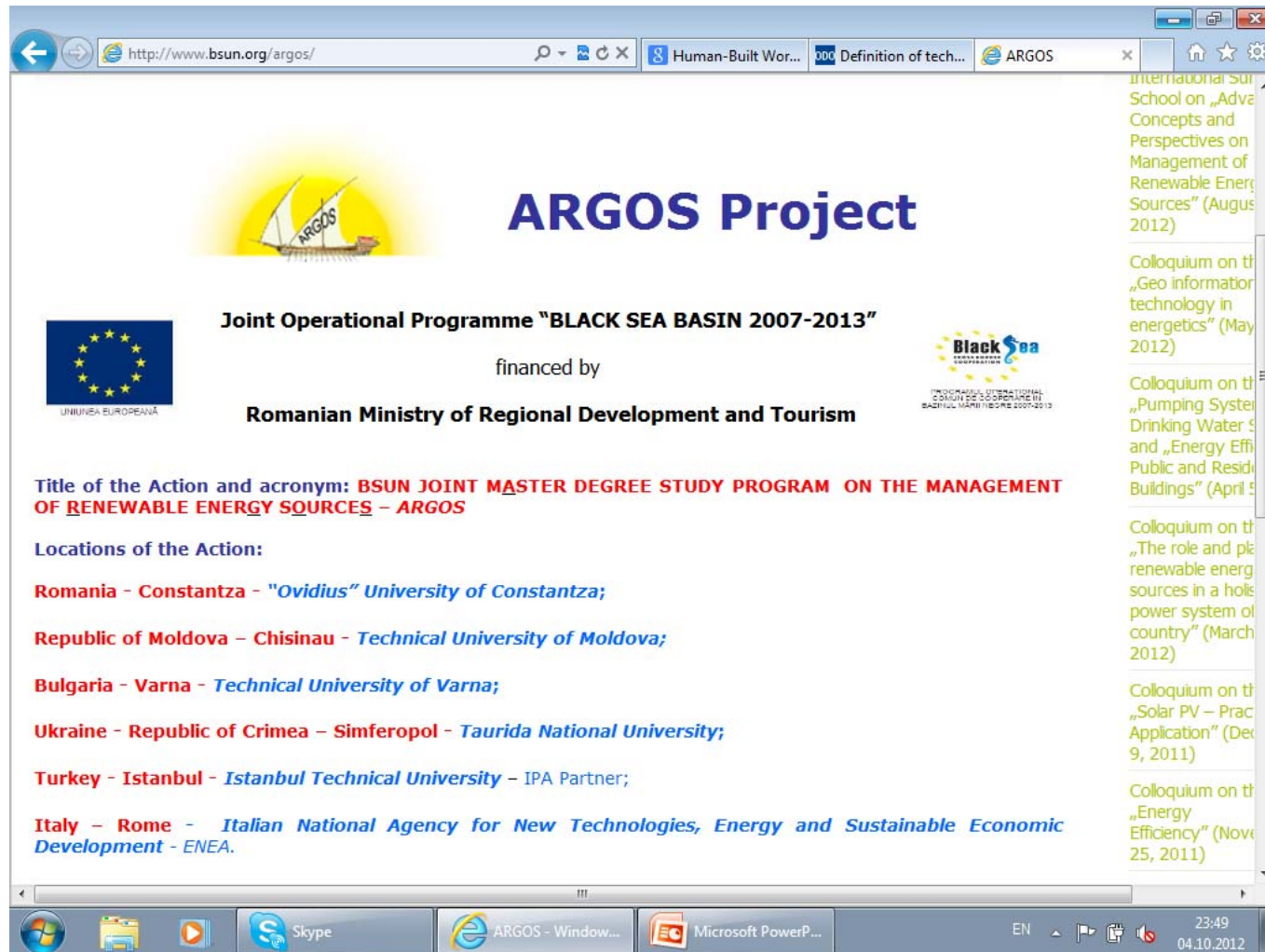
- COSE at **Thales Alenia Space**, Torino
- ISDEC at **Thales Alenia Space**, Roma
- CDF at **La Sapienza Univ.**, Roma
- CEF at **ASI**, Roma

legenda

Agency
Industry
University



ARGOS Project



The screenshot shows a web browser window displaying the ARGOS Project website. The browser's address bar shows the URL <http://www.bsun.org/argos/>. The website content includes the ARGOS logo (a sailboat on a sun), the title "ARGOS Project", and information about the "Joint Operational Programme 'BLACK SEA BASIN 2007-2013'" financed by the "Romanian Ministry of Regional Development and Tourism". The website also lists the title of the action and the acronym "BSUN JOINT MASTER DEGREE STUDY PROGRAM ON THE MANAGEMENT OF RENEWABLE ENERGY SOURCES - ARGOS". Below this, it lists the locations of the action in various countries: Romania, Republic of Moldova, Bulgaria, Ukraine, Turkey, and Italy, along with the corresponding universities and partners.

ARGOS Project

Joint Operational Programme "BLACK SEA BASIN 2007-2013"
financed by
Romanian Ministry of Regional Development and Tourism

Title of the Action and acronym: BSUN JOINT MASTER DEGREE STUDY PROGRAM ON THE MANAGEMENT OF RENEWABLE ENERGY SOURCES - ARGOS

Locations of the Action:

- Romania - Constantza - "Ovidius" University of Constantza;**
- Republic of Moldova - Chisinau - Technical University of Moldova;**
- Bulgaria - Varna - Technical University of Varna;**
- Ukraine - Republic of Crimea - Simferopol - Taurida National University;**
- Turkey - Istanbul - Istanbul Technical University - IPA Partner;**
- Italy - Rome - Italian National Agency for New Technologies, Energy and Sustainable Economic Development - ENEA.**

International School on „Advanced Concepts and Perspectives on Management of Renewable Energy Sources” (August 2012)

Colloquium on the „Geo information technology in energetics” (May 2012)

Colloquium on the „Pumping System Drinking Water Supply and „Energy Efficiency in Public and Residential Buildings” (April 2012)

Colloquium on the „The role and place of renewable energy sources in a holistic power system of the country” (March 2012)

Colloquium on the „Solar PV – Practical Application” (December 9, 2011)

Colloquium on the „Energy Efficiency” (November 25, 2011)

ISS on PEMFC



The poster features a night photograph of a tall, illuminated clock tower. At the top left, there is a logo for the European Commission. Below it, a blue banner reads 'Institute for Energy and Transport (IET)'. The main title is 'INTERNATIONAL SUMMER SCHOOL ON PEM FUEL CELLS'. Below the title, it states 'ACCREDITED ACCORDING TO THE EUROPEAN CREDIT TRANSFER SYSTEM (ECTS)'. The dates '17 - 22 JUNE 2013' and the location 'BURSA TECHNICAL UNIVERSITY BURSA, TURKEY' are listed. At the bottom, it says 'For detail information please visit: www.bsun.org'.

European Commission
Institute for Energy and Transport (IET)

**INTERNATIONAL SUMMER SCHOOL
ON
PEM FUEL CELLS**

**ACCREDITED
ACCORDING TO THE
EUROPEAN CREDIT TRANSFER SYSTEM (ECTS)**

17 - 22 JUNE 2013

**BURSA TECHNICAL UNIVERSITY
BURSA, TURKEY**

For detail information please visit: www.bsun.org



The poster features a landscape photograph of a valley with unique rock formations and several hot air balloons in the sky. The text is centered and reads: 'INTERNATIONAL SUMMER SCHOOL ON PEM FUEL CELLS ACCREDITED according to the European Credit Transfer System (ECTS)'. The dates '16 - 20 July 2012' and the location 'Nevsehir, Turkey' are listed at the bottom.

**INTERNATIONAL SUMMER SCHOOL
ON
PEM FUEL CELLS**

**ACCREDITED
according to the
European Credit Transfer System (ECTS)**

**16 - 20 July 2012
Nevsehir, Turkey**



Upcoming Events



PTC®



**International Summer School on:
*Virtual Engineering Software Solutions for Space Applications
as Nano-Labs & Nano-Sats using the PTC ThingWorx Platform -
VESPER***

- A Hack-a-Thon Event -

September 5th – 16th 2016, Constantza, Romania

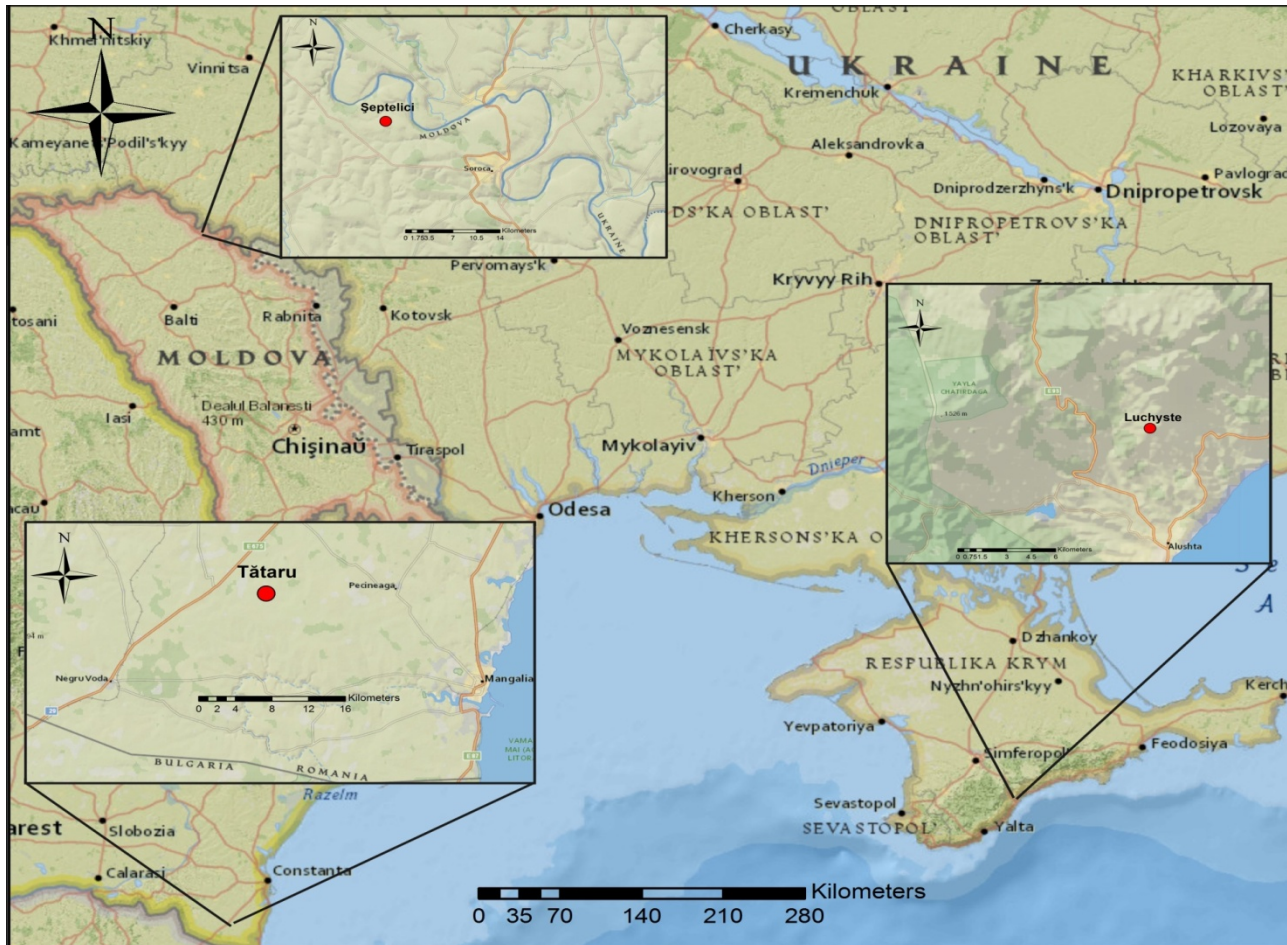
Chairmanship:

Dumitru Dorin Prunariu, Romanian Cosmonaut
Acad. Michaylo Zgurovski, Rector of National Technical University of Ukraine

Aim & Objectives:

The aim of the summer school is the evaluation of the state of the art in the field of Virtual Engineering Software Solutions for Nano-Labs and Nano-Sats and to focus the efforts of very talented and experienced students in software engineering to develop reference frameworks for such applications using PTC ThingWorx Platform.

Joint Research





Conclusions

- **The competitiveness of the Black Sea Region is depending fundamentally on the understanding, learning and implementing ecoinnovation as a basic principle of corporate culture and in such a way to be able to cope with the complexity of the factors connected to sustainable development and green economy by paving the road to Industrial Revolution 4.0.**
- **The Universities could be partners with high potential to contribute to the development and consolidation of the innovation capacity of the highly competitive suppliers of products and services from the region.**



Conclusions

- **A new kind of literate is needed, one who can innovate by reasoning broadly across disciplines and by considering the human dimensions that are at the heart of every challenge.**
- **If for centuries, in education it has been followed an approach based on the use of logics, math and sciences by linear, mechanistic and discreet reasoning, in the new context we have to move towards interdisciplinary, eco-innovative and holistic approaches.**
- **This means that by integrating knowledge across disciplines, to deal with complex problems for better serve humanity and in this way to serve ourselves.**
- **In order to be prepared for these challenges, aside from comprehensive knowledge in all traditional courses, our students have to understand the connections among the courses and to integrate, or “unify,” their learning.**



Vivat, Crescat, Floreat ZNTU!





Thank you for your attention!



and please, send your comments at:
emamut@univ-ovidius.ro