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Logistics proposition Life Sciences & Health

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Version 4.0

Holland International Distribution Council

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Life Sciences & Health: GICS sector classification

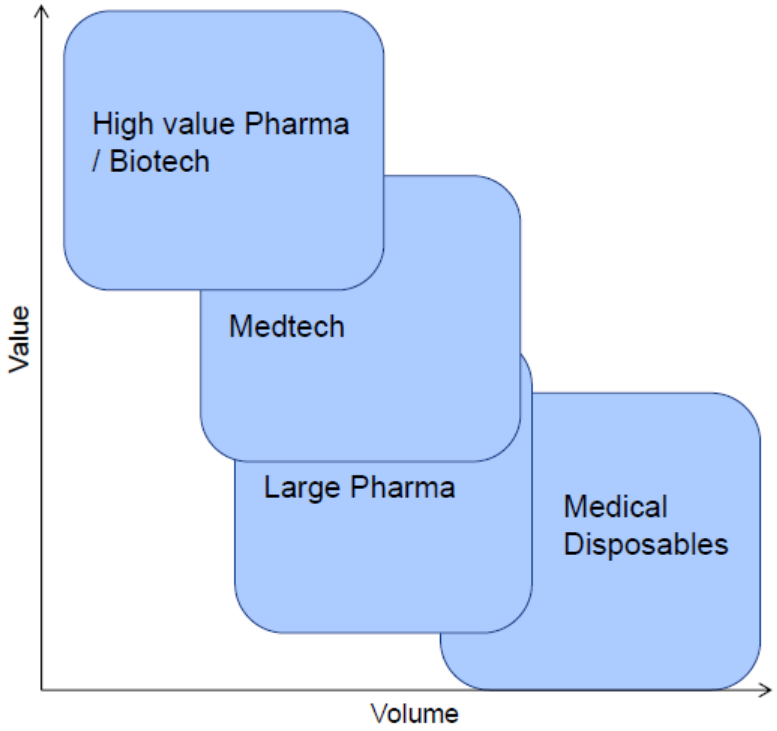
The **Health Care Sector** includes health care providers & services, companies that manufacture and distribute health care equipments & supplies and health care technology companies. It also includes companies involved in the research, development, production and marketing of pharmaceuticals and biotechnology products.

Health Care Equipment & Services	**Health Care Equipment & Supplies**	**Health Care Equipment**
		Manufacturers of health care equipment and devices. Includes medical instruments, drug delivery systems, cardiovascular & orthopedic devices, and diagnostic equipment.
		Health Care Supplies
		Manufacturers of health care supplies and medical products not classified elsewhere. Includes eye care products, hospital supplies, and safety needle & syringe devices.
	Health Care Providers & Services	**Health Care Distributors**
		Distributors and wholesalers of health care products not classified elsewhere.
		Health Care Services
		Providers of patient health care services not classified elsewhere. Includes dialysis centers, lab testing services, and pharmacy management services. Also includes companies providing business support services to health care providers, such as clerical support services, collection agency services, staffing services and outsourced sales & marketing services
		Health Care Facilities
		Owners and operators of health care facilities, including hospitals, nursing homes, rehabilitation centers and animal hospitals.
		Managed Health Care
		Owners and operators of Health Maintenance Organizations (HMOs) and other managed plans.
	Health Care Technology	**Health Care Technology**
		Companies providing information technology services primarily to health care providers. Includes companies providing application, systems and/or data processing software, internet-based tools, and IT consulting services to doctors, hospitals or businesses operating primarily in the Health Care Sector
Pharmaceuticals, Biotechnology & Life Sciences	**Biotechnology**	**Biotechnology**
		Companies primarily engaged in the research, development, manufacturing and/or marketing of products based on genetic analysis and genetic engineering. Includes companies specializing in protein-based therapeutics to treat human diseases. Excludes companies manufacturing products using biotechnology but without a health care application.
	Pharmaceuticals	**Pharmaceuticals**
		Companies engaged in the research, development or production of pharmaceuticals. Includes veterinary drugs.
	Life Sciences Tools & Services	**Life Sciences Tools & Services**
		Companies enabling the drug discovery, development and production continuum by providing analytical tools, instruments, consumables & supplies, clinical trial services and contract research services. Includes firms primarily servicing the pharmaceutical and biotechnology industries.

The Global Industry Classification Standard (GICS®) was developed by MSCI, a premier independent provider of global indexes and benchmark-related products and services, and Standard & Poor's (S&P), an independent international financial data and investment services company and a leading provider of global equity indexes.

Life Sciences & Health: segmented subsectors

Segmentation



Supply chain characteristics

Elements	High value pharma / biotech	Large Pharma	Medtech	Medical Disposables
Value density	++ / +++	- / +	++ / +++	-
Volume	-	++	-	++ / +++
Order to delivery leadtime (EU)	Next-day	Next-day – 72 hours	Next-day (pre-x)	Next-day – 72 hours
Temp control importance	+++	++	+	0 / +
Distribution profile	Parcel	Pallet	Parcel	Pallet
Level of country-specific SKUs	+++	++	+++	+ / ++
Main commercial channel	Mix Direct/Indirect	Indirect	Direct	Mix Direct/Indirect

Source: Buck Consultants International

Life Sciences & Health: global trends & developments

Several worldwide trends have fueled the industry's growth and remain favorable in the long term:

1. **Aging population**, especially in the large markets (Americas and Europe). The growth rate for the world's 65+ year-old population is projected to outpace that of the 0-4 year-old segment by 2020, thus increasing demand for life sciences industry products and services.

2. **Rising incidence of chronic diseases.** As a result of changes in lifestyle and eating habits, people are becoming more prone to chronic diseases such as diabetes and hypertension which, in turn, are high risk factors for heart attack and stroke. The demand for and use of preventive drugs and medical devices and other assisted technologies like e-health and mobile health are increasing, as a result.

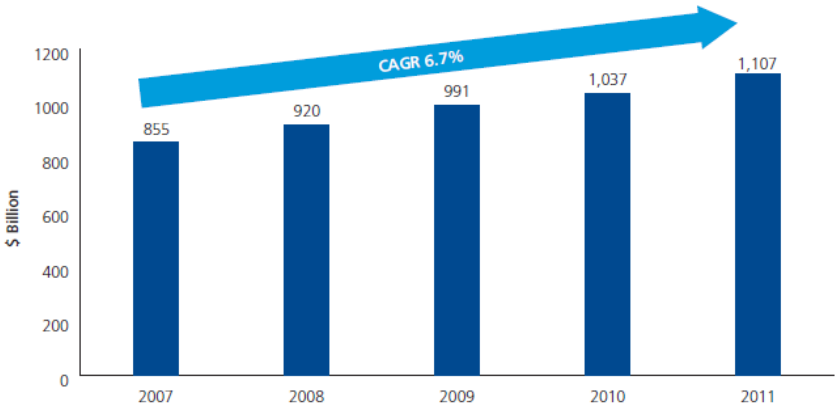
3. **Opportunities in emerging markets.** Companies increasingly are targeting growth in emerging markets as a way to offset sluggishness in developed regions. Technological advancements and product innovation. The areas of biotechnology and biosimilars, combination devices, and "big data" analytics are particularly active.

4. **Health care reform provisions, including increases in government funding and broader insurance coverage.** In particular, the extension of health insurance to more than 30 million uninsured U.S. citizens under the Patient Protection and Affordable Care Act (PPACA or ACA) in 2014 is estimated to increase demand across the entire life sciences and health care industry in that country.

Source: 2013 Global life sciences outlook - Optimism tempered by reality in a "new normal" – Deloitte

Life Sciences & Health: global trends & developments

Figure 1: Global pharma & biotech revenue, 2007-2011

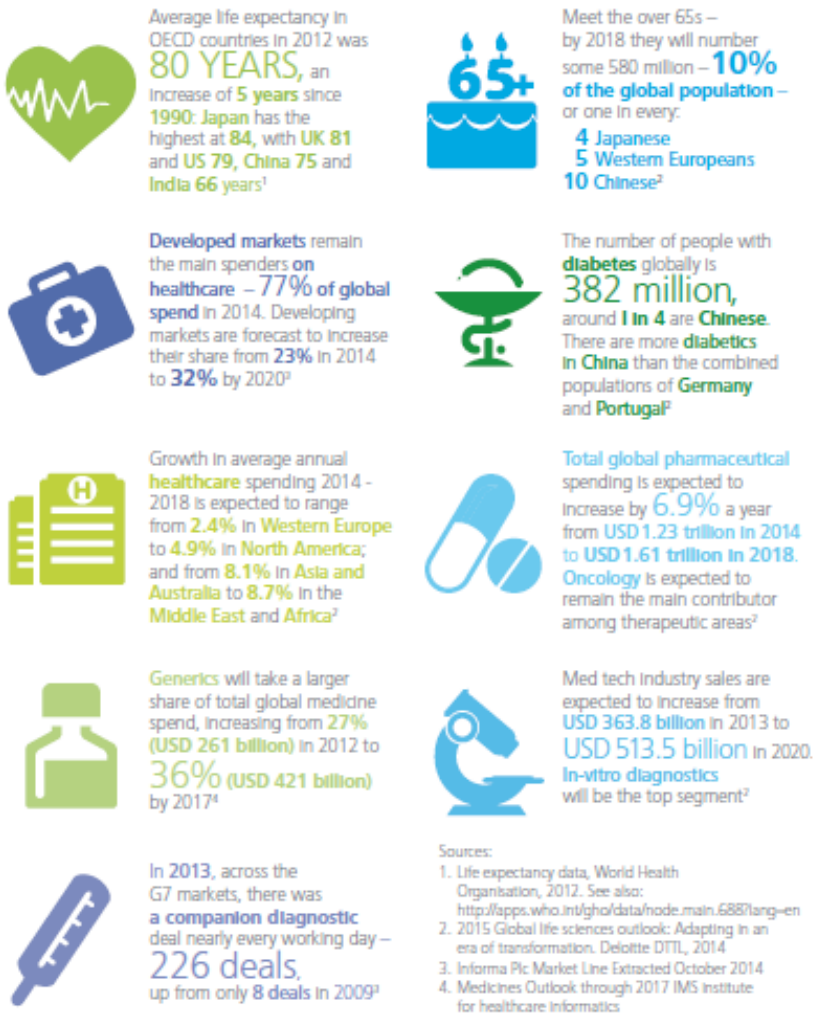


Call it a case of optimism tempered by reality: Following years of growth and favorable market trends, **the global life sciences industry now finds itself facing a challenging "new normal."**

A changing health care landscape, expiring patents and generic competition, pricing pressures, heightened regulatory scrutiny, expansion into emerging markets, increasing alliances and acquisitions, and a persistent economic slowdown are **prompting global life sciences companies to adopt new business models designed to counter slowing sales growth and declining profitability, deliver better patient outcomes at lower cost**, and position them for success in 2013 and beyond.

Source: 2013 Global life sciences outlook - Optimism tempered by reality in a "new normal" – Deloitte

Estimates health care 2020



Source: Deloitte

Data explosion forecast 2020

New business models: 'Beyond the pill', outcomes and real world data are providing health data and transforming what is possible

Supply drivers

Medical & patient data
Electronic health records (EHRs), health sensors, social media, and genomics create rich new data sources for analytics

Big Data analytics
Cheap computing power and sophisticated analytics drive insights into patient behaviour, treatment costs and R&D

Mobile/mHealth
Pervasive mobile and smart phone adoption creates new engagement models within daily routines

Healthcare professional digital workflow
Increasing integration of EHRs and telehealth driving new digitally-enabled coordinated workforce models of care

Health information technology enabled opportunities

Demand drivers

Rollout business models tied to patient outcomes that also reduce medical errors and improve quality

Discover and deliver targeted and personalised therapies with real world evidence of impact

Influence patients behaviours 'beyond the pill' and sustain engagement outside the traditional care setting

Drive population management, protocol driven patient risk pool and stratification management

Source: Monitor Deloitte

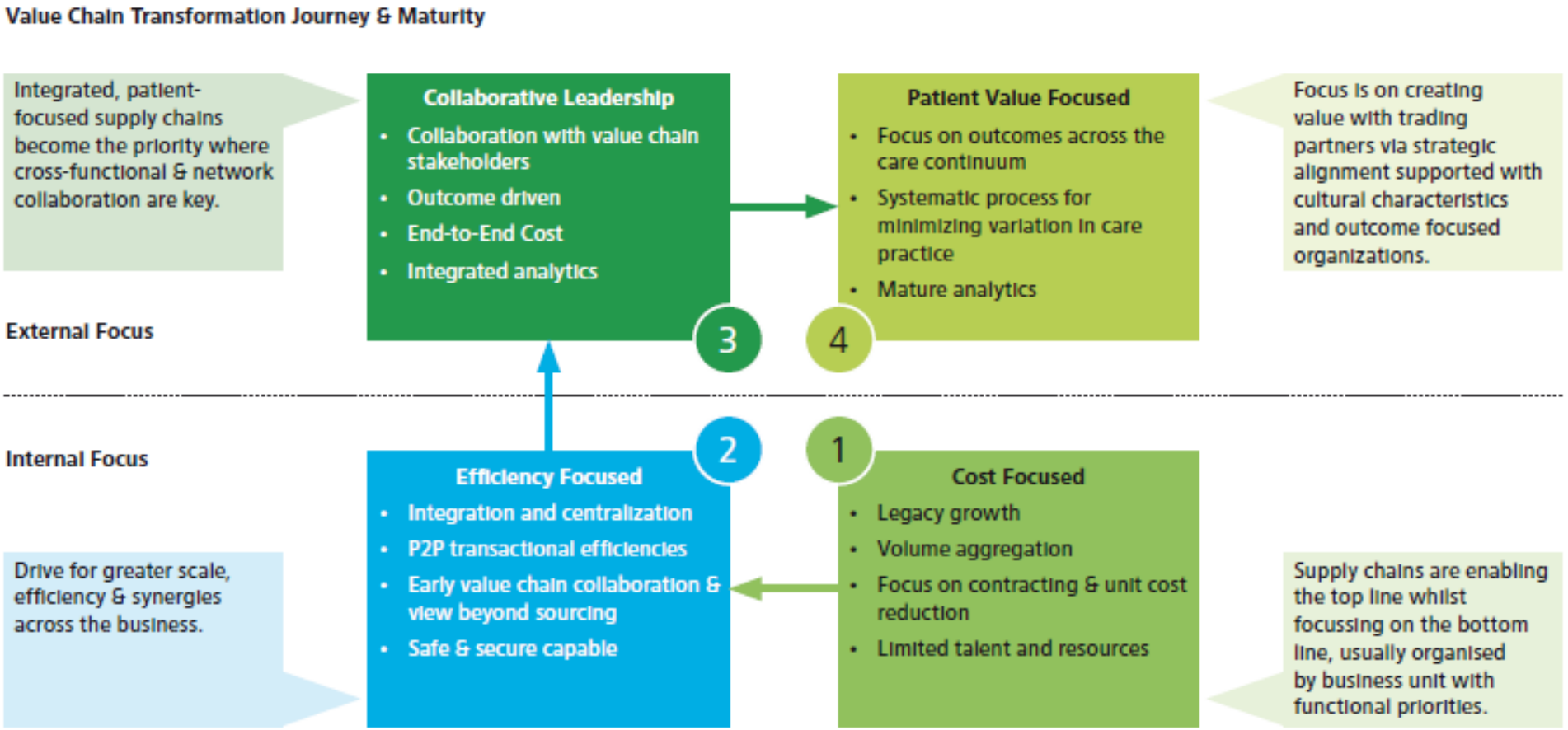
LS Supply chain & Manufacturing 2020

Prediction

The supply chain now is at the centre of the delivery of healthcare – not just supplying a product but delivering a better clinician and patient experience; in some cases the supply chain reaches the patients home directly. Working together with R&D, new products in 2020 are designed to capture data from the point of manufacture to the point of administration with the patient and even tracking compliance. Regulators can more than ever be assured of compliance, clinicians and patients benefit from tracking of medicines, and pharmacies from understanding exact usage and the elimination of waste. The digital enablement of supply and delivery channels will lead to a true networked operation, with supply chain playing a key role as orchestrator.

Source: Deloitte

Supply Chain requirements 2020



Source: https://www.gartner.com/doc/1497915/stages-value-chain-transformation-revisited

Life Sciences & Health: global trends & developments

10 stakeholder considerations:

1. R&D future models
2. Brand strategy/pricing
3. M&A and collaborations
4. Operational efficiency
5. New commercial models
6. Health analytics
7. Regulatory compliance
8. Healthcare reform
9. Innovation and value
10. Smaller and connected world

Source: 2013 Global life sciences outlook – Optimism tempered by reality in a "new normal" – Deloitte

2014 Global life sciences outlook – Resilience and reinvention in a changing marketplace – Deloitte

Life Sciences & Health: supply trends & developments

1. We expect a shift from undifferentiated logistics structures to **more differentiated supply chains,** with the mode of transportation, warehousing and depth of distribution tailored to different life sciences product categories.

2. We believe that manufacturers in the life sciences sector will build up **direct-distribution channels to the end consumer.** They will either develop their own e-commerce operations or distribute their products via third-party platforms.

3. We see pharmaceutical and medical device manufacturers **expanding their capabilities to tier-2 and tier-3 cities** and sometimes even to rural areas **in emerging countries.** However, there are likely to be differentiated approaches to depth of distribution and to implementation strategies.

4. In future, we expect that better **visibility** in the supply chain will be required not only for product security and integrity, but also because of the need to control and optimize logistics processes (for example, with **outsourcing** and **emergency logistics complementing slower-mode transportation** and **demand-driven supply chains**). At the same time, visibility will enable differentiation and create value (for example, with direct-distribution models, mentioned in 2. above).

5. Finally, we foresee the need for manufacturers in the life sciences sector to **keep supply chains flexible** to adapt to new regulatory standards and the distribution requirements of innovative products. We expect more temperature-differentiated supply-chain solutions, as well as infrastructures adaptable for product bundles and more personalized medicines and implants.

Source: DHL – Key logistics Trends in Life Sciences 2020+

Life Sciences & Health: supply trends & developments

	Medtech	Pharma
Centralization of Supply Chain Control	• Common Practice for many years	• Strengthening of SC Organizations • Investments in SC Talent • Corporate SC taking ownership of the downstream supply chain
Network Consolidation	• Common Practice for many years	• Consolidation of Distribution Networks • Mix of full centralization, regionalization and hub-spoke models • Scope: downstream, still lack of full chain scope
Visibility	• Control Tower / Transport Management concepts • Linking inbound, intercompany and secondary distribution • Information is Key	• Control Tower / Transport Management concepts • Linking inbound, intercompany and secondary distribution • Information is Key
Outsourcing & Partner Portfolio Reduction	• Main DCs still often insourced (at least at the big players) • Development towards outsourcing observed	• 3PL landscape in pharma has improved highly • Towards LLP/4PL models • Strong reduction of number of partners used • Towards harmonized (global) contracts

Source: Buck Consultants International

Life Sciences & Health: supply trends & developments

	Medtech	Pharma
Customer Service / Order to Cash process harmonization	• CS/O2C mainly in-house • Increasing interest in outsourcing and centralization of back-offices	• CS and O2C activities closely linked to physical supply chains • Harmonization & centralization of CS and O2C organizations
Supply Chain Differentiation	• From one size fits all to differentiated supply chains per product/market combination • SC becoming a stronger counterpart for the commercial team, challenging service requirements	• From one size fits all to differentiated supply chains per product/market combination • SC becoming a stronger counterpart for the commercial team, challenging service requirements
Supply Chain Collaboration	• Logistics not a key differentiator, therefore the industry is recognizing the opportunities of collaboration • How to break through from pilots to full realization?	• Logistics not a key differentiator, therefore the industry is recognizing the opportunities of collaboration • How to break through from pilots to full realization?

Source: Buck Consultants International

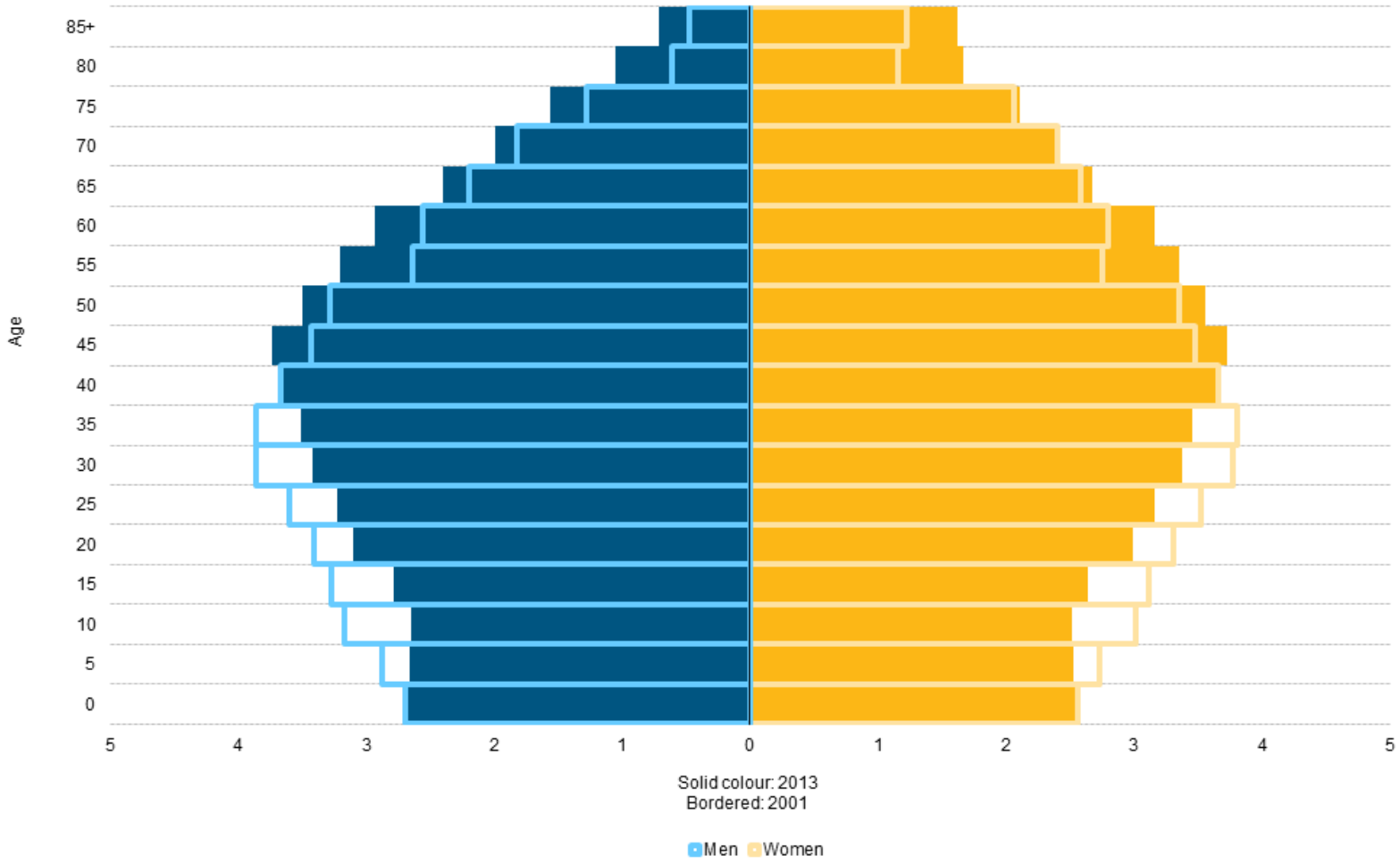
Life Sciences & Health: location factors

Factors	High value pharma / biotech	Large Pharma	Medtech	Medical Disposables
Closeness to market (COG)	-	++	-	++
Closeness of main integrator hubs	++	- / +	+++	0
Availability of healthcare 3PLs	+++	++	0 / +	0 / +
Political Stability	++	++	++	++
Labor Market Stability	++	++	++	++
Tax, Labor, Customs Landscape	++	++	++	++
Intermodal Solutions	-	+(+)	-	+(+)
Peer Presence	++	+	++	+
Transport-related costs	+	+(+)	++	+++
Facility-related costs	0	+(+)	+(+)	+++

Source: Buck Consultants International

Life Sciences & Health: facts & figures

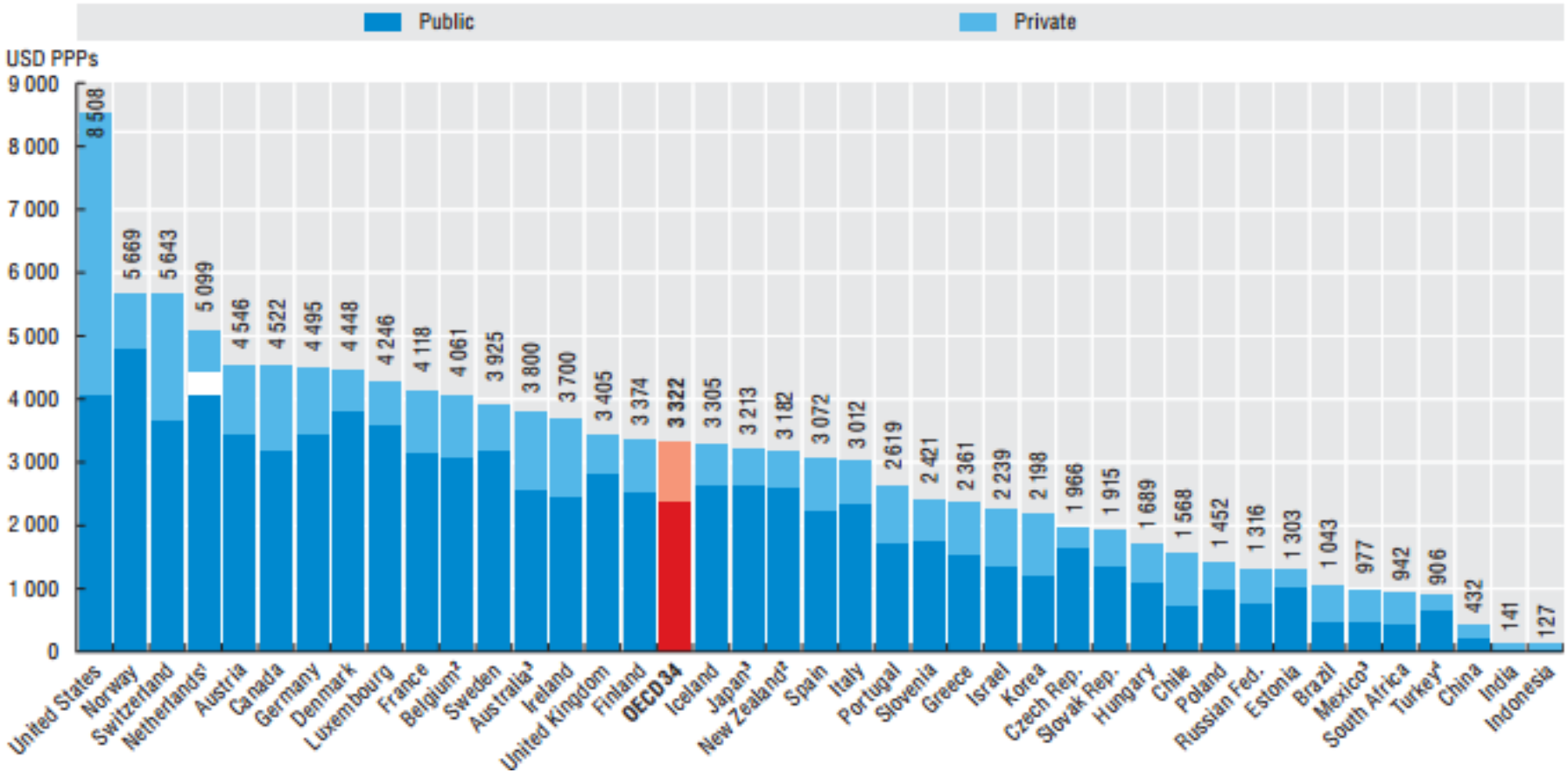
EU 28 ageing: age as a % of total population in 2001 and 2013



Source: Eurostat

Life Sciences & Health: facts & figures

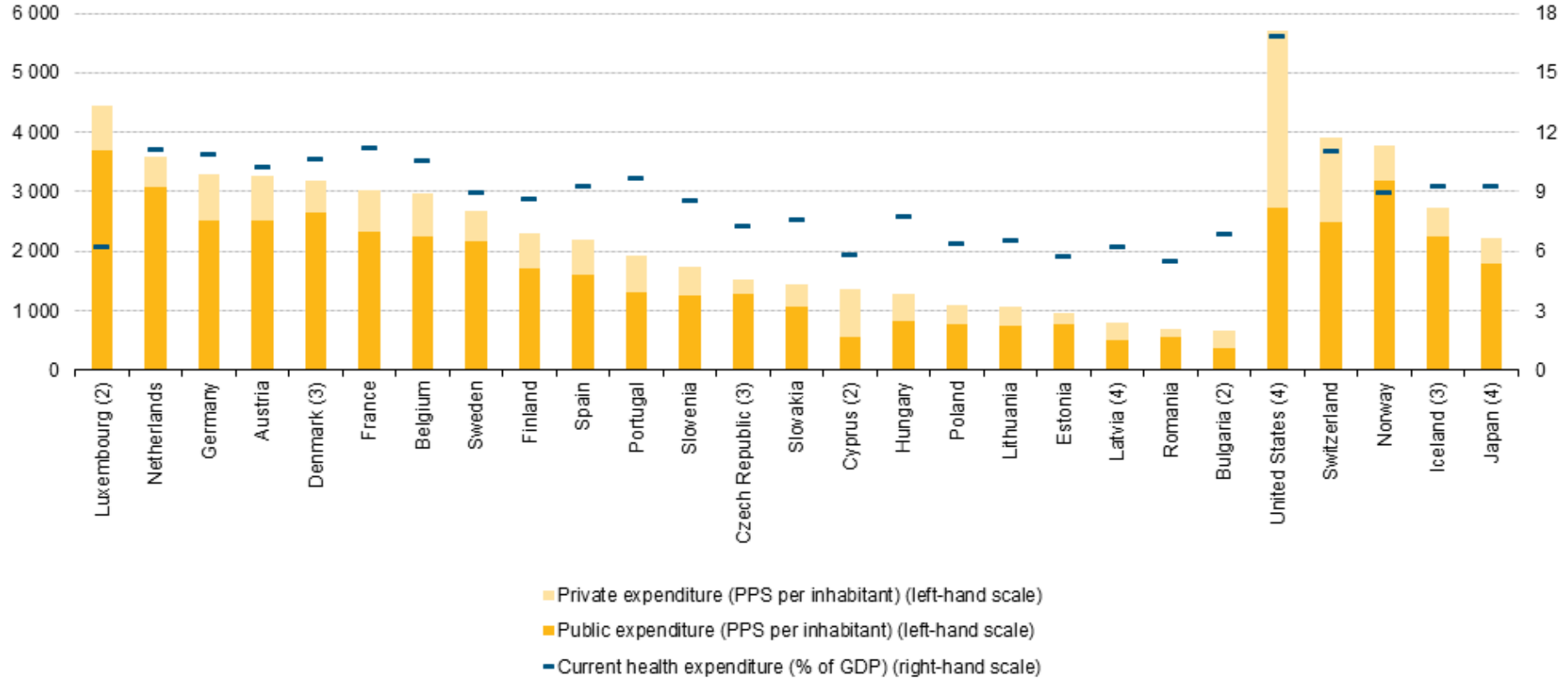
Health expenditure per capita, 2011 (or nearest year)



Source: OECD

Life Sciences & Health: facts & figures

Health expenditure per capita, 2011 (or nearest year)



Source: Eurostat

Life Sciences & Health: facts & figures

Over the past decade the global life sciences sector has experienced healthy growth. The world market for pharmaceuticals, for example, has doubled within a decade. It has reached a value of about USD 1 trillion and is expected to grow by another 3 to 6 per cent per annum until 2016 (IMS 2012a). Strong growth rates until 2020 are also forecast for the market for medical devices.

Source: DHL – Key logistics Trends in Life Sciences 2020+

Life expectancy in OECD countries is rising, but so is the burden of chronic diseases

Population ageing increases demand for long-term care and puts pressures on public spending, despite informal care

Source: Health at a Glance 2013 – OECD indicators

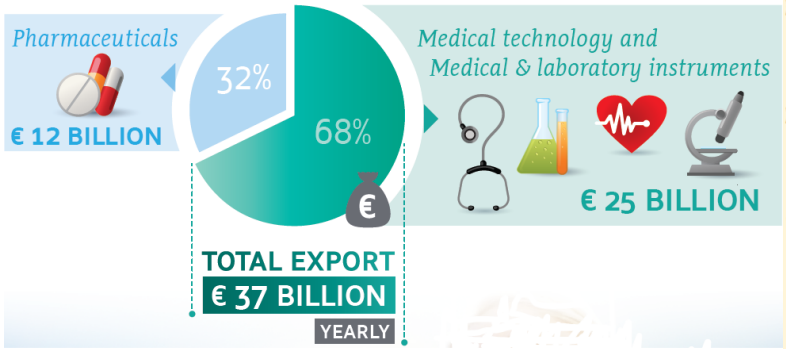
The sector invests

OVER € 2 BILLION IN R&D EACH YEAR

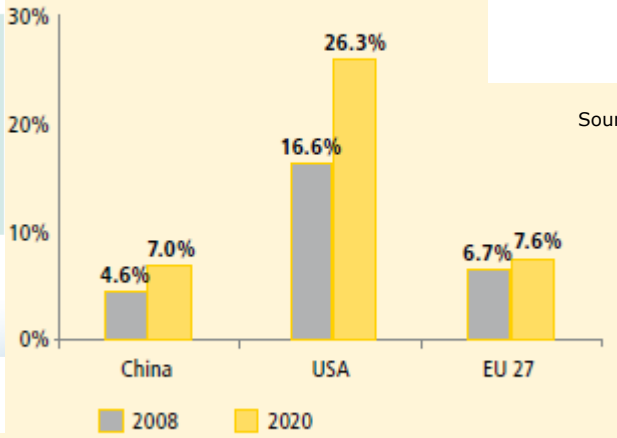
It already accounts for 2.5% of GDP

Source: Infographic – Dutch Life Sciences sector

THE NETHERLANDS LIFE SCIENCES SECTOR



5. Health Expenditure (as Percentage of GDP)



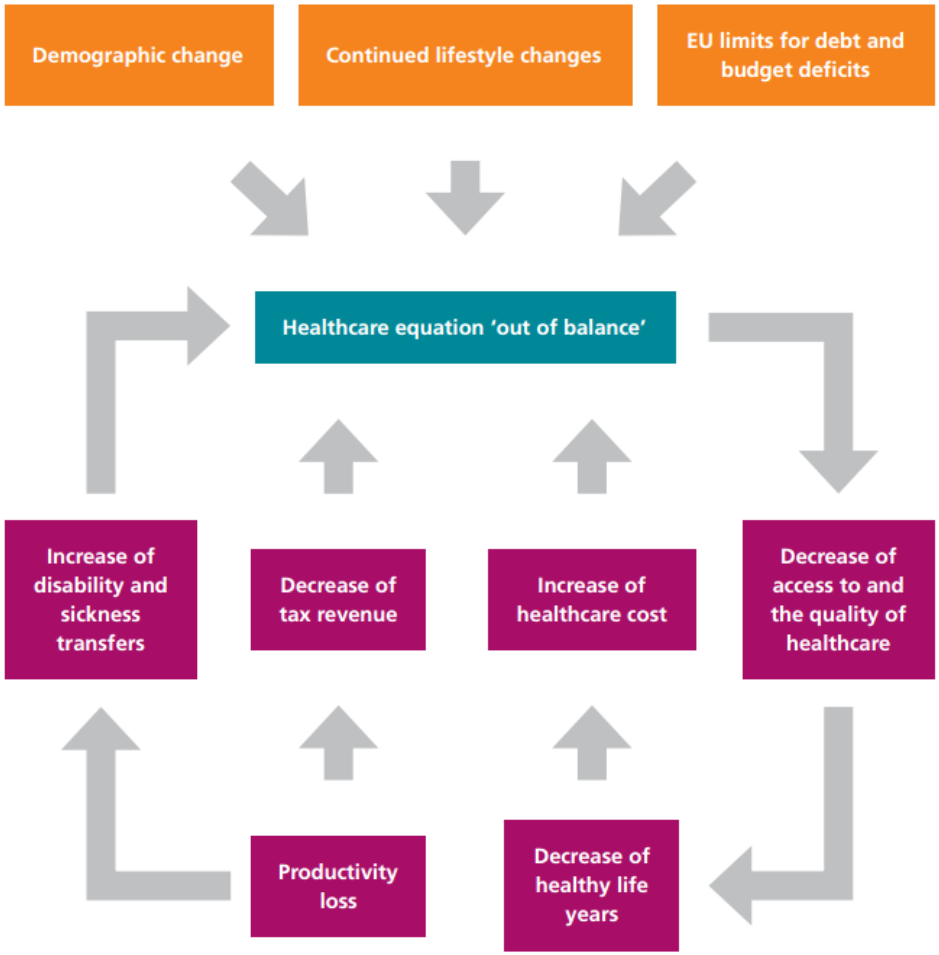
Source: McKinsey 2012, CMS GOV. 2013 and European Commission 2012

With approximately 350 life sciences companies clustered within a 120-mile radius, The Netherlands is the most geographically concentrated region in the world when it comes to creating economic and social value in Life Sciences & Health.

Source: Infographic – Dutch Life Sciences sector

Life Sciences & Health: facts & figures

European healthcare equation



Source: EFPIA - A vision towards a life sciences strategy for Europe

Innovation in care institution logistics

Lucrum

- Not-for-profit organization Lucrum assists organizations to take advantage of collaboration and introduce bundling concepts in logistics, purchasing and knowledge transfer.
- Lucrum is a collaboration between 46 care institutes, representing 1000 locations in the Netherlands.

REQUIREMENTS

- Delivery to small scale healthcare homes
- Increasing number of care requirements - ageing society
- Cost reductions requirements due to budget cuts
- Delivery on specialized department level of care institutes
- Reduction of logistics movements and administration

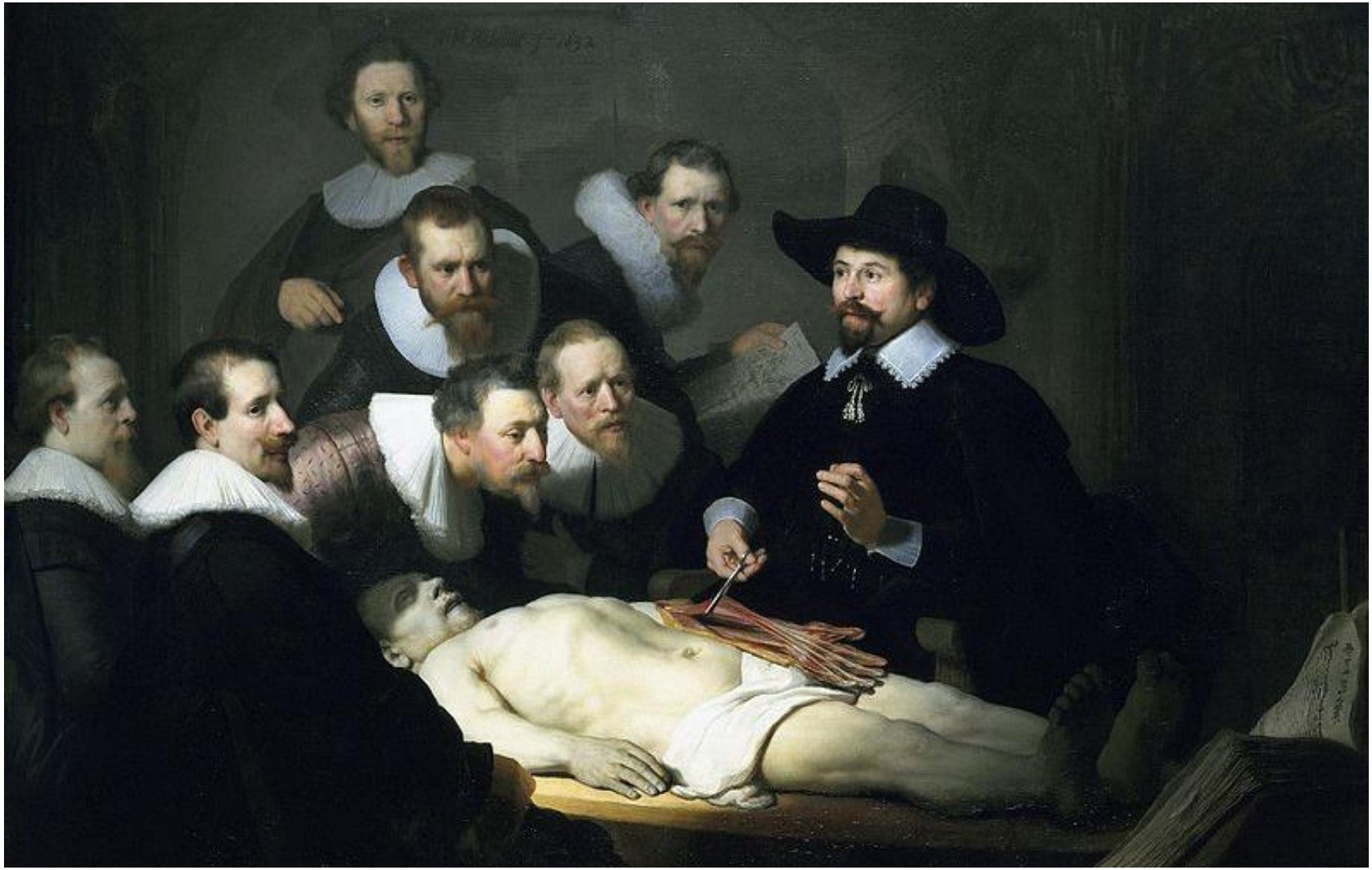
SOLUTION

- Bundling of supply of products to healthcare institutions, incl food, medical disposables and medicines
- Cross & Care Logistics with central distribution centre operated by Huuskes Logistics
- Central order processing, invoicing IT solution by CAPE Group

BENEFITS

- Reduction of logistics movements, reduction of emissions and noise
- Reduction of logistics costs
- Elimination of need for stock room; use for healthcare delivery
- Consolidation to monthly invoice
- Inclusion of return flows (waste, laundry)
- Integrated supply offering

The Netherlands Life Sciences hub in Europe



Life Sciences in The Netherlands

The most concentrated life sciences region in the world: more than 400 innovative R&D life sciences companies within a 120 mile radius.

- Most open, excellent and attractive research system in the EU (Innovation Scoreboard 2013).
- 8th place WEF Global Competitiveness Report 2014.
- Strong position in molecular imaging, medical informatics, biopharmaceuticals, human and veterinary vaccines, regenerative medicine and biomaterials, medical technology and health infrastructure.

Source: Netherlands Foreign Investment Agency

Key aspects and strengths

Dutch healthcare: high quality, accessible and affordable

"The Netherlands is the landslide winner of the Health Consumer Powerhouse (HCP) Index 2014, they have the best healthcare system in Europe" .

- Strong primary and outpatient care
- Delivered at a relatively low cost
- One of the best documented (patient) populations; accessible and well-structured bio-banks
- Expertise in health care infrastructure
- Strong medical research infrastructure
- Global market leader in mobile healthcare

- Dutch healthcare ranks number one compared to the US, Australia, Germany, and Canada.
- Total healthcare expenditure in the Netherlands: 15.6% of GDP, 94.2 billion Euro's (2013)
- 1.3 million people work in the healthcare sector (2012)

Source: CBS

Top Sector Life Sciences & Health

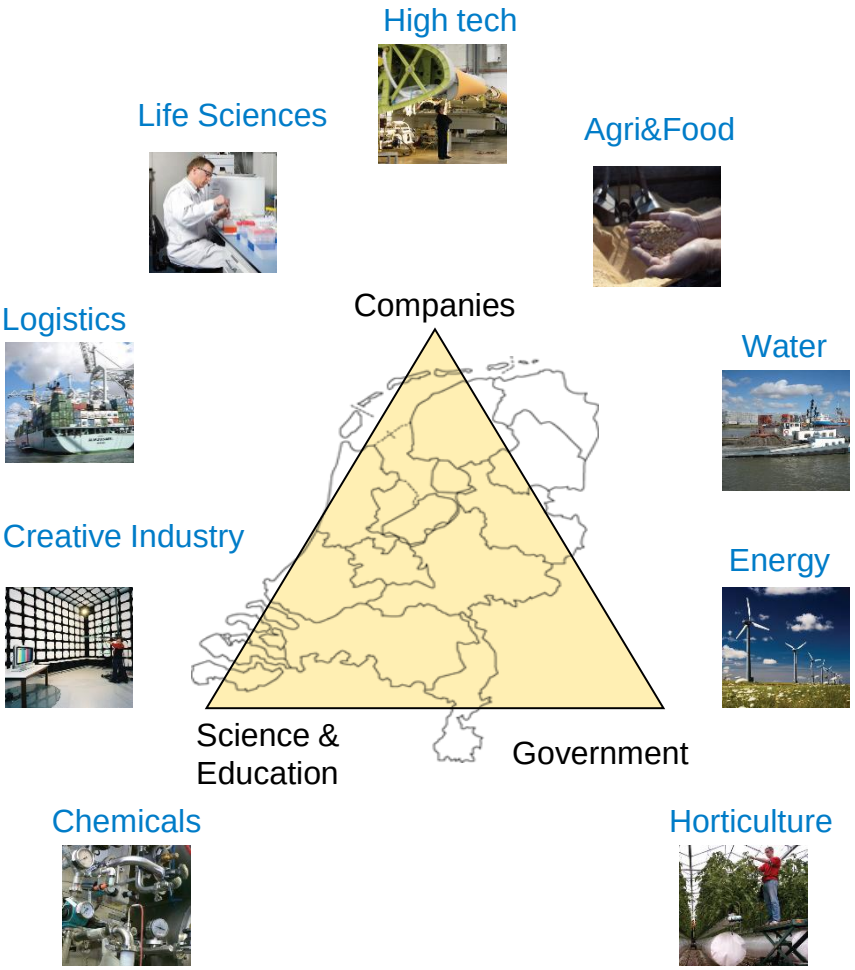
Dutch industry policy: Life Sciences & Health (LSH) appointed by the Dutch government as priority sector.

Approach: integral , demand-driven solutions that contribute to health & wellbeing in the broadest sense.

Public Private Partnerships: top teams formed with representatives of Industry, Academia and Government

Themes

- Healthy ageing: self management & regenerative medicines
- Medical Devices
- Personalized nutrition
- E-health
- Personalized medicines



Source: Netherlands Foreign Investment Agency

Recent business highlights

Glybera®, the first gene therapy approved in the western world

The Dutch SME uniQure received approval from the European Commission for the gene therapy Glybera®, a treatment for patients with lipoprotein lipase deficiency. uniQure signed an EU commercialization agreement with Chiesi Farmaceutici.

The Medicines Company acquires Dutch ProFibrix in a deal worth $240M following PhIII success

Profibrix has developed Fibrocaps, an easy-to-use dry-powder formulation of fibrinogen and thrombin that can be used to stop bleeding during surgery. The plan now is to file for EU approval in the fourth quarter of 2013, with an FDA application following in the first quarter of 2014.

€196 million pan-European drug discovery platform launched

The 'European Lead Factory' is a pan-European platform for drug discovery supported by the Innovative Medicines Initiative (IMI) that is set to give a major boost to drug discovery in Europe. The Netherlands-based non-profit TI Pharma will facilitate the governance of this new project and is responsible for the scientific management of the screening center.

Merus secures additional €31m

Dutch biopharma company Merus has received a €31m extension of its 2010 series-B funding round from Johnson & Johnson Development Corporation (JJDC) and its existing venture capital backers, Novartis Venture Fund, Pfizer Venture Investments (PVI), Bay City Capital, Life Sciences Partners (LSP) and Aglaia Biomedical Ventures

Source: Netherlands Foreign Investment Agency

Access to high quality research

R&D climate in The Netherlands

- 8 University Medical Centers – 14 Research Universities - 137 general hospitals
- The Netherlands obtains US$72,800 per university researcher from the business world. This is the highest ranking among European countries, 3rd worldwide. *Source: Times Higher Education (2013)*
- 8th worldwide ranking in life sciences and health patents (2012).
- High publication output & Citation impact: the Netherlands ranks in the top together with countries such as the US, Switzerland and Denmark.

International outlook

- **High success rates** in European fund and grant applications; within the EU Commission's R&D Program almost half of the initiatives in the health sector cluster involve Dutch participants.
- **History of investing in international partnerships**; about 70% of Dutch life sciences companies work together with foreign companies and knowledge centers.

Source: Netherlands Foreign Investment Agency

Top infrastructure for clinical research

The Netherlands: perfect test market for innovative concepts

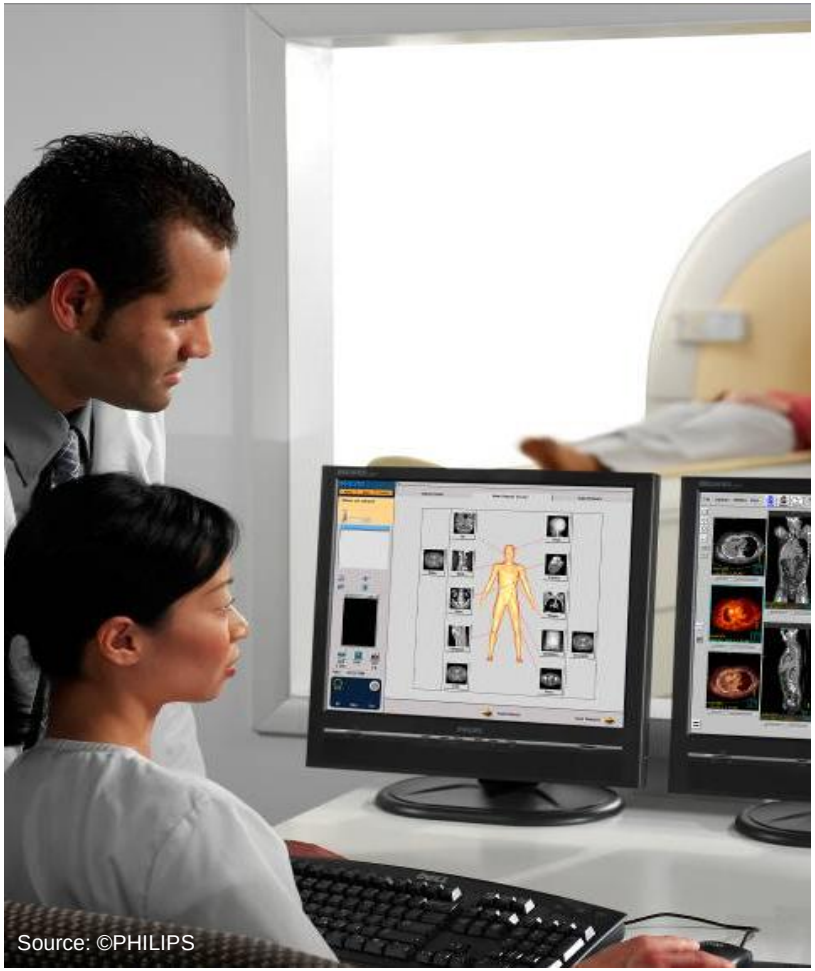
- The Netherlands has one of the best documented populations in the world.
- Easy to start clinical trials with a high degree of patient participation and easy follow-up.
- Drug approval time is significantly less than in other countries.

Extensive Data/Biobanking

BBMRI-NL Coordinates Dutch Biobank collaboration.

Several patient cohorts:

- Lifelines (Groningen): universal risk factors and their modifiers for multi-factorial diseases. Three generation cohort study (165,000 patients monitored over 30 years)
- String of Pearls Initiative: biobank infrastructure linking all university medical centers (largest in the EU!) gathering clinical data and biomaterials for nine different disease areas "pearls"



Source: Netherlands Foreign Investment Agency

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Tax advantages of The Netherlands

Attractive features of the Dutch tax regime include:

- **Fiscal incentives** exist for the procurement of **environmentally and energy-efficient equipment** and **R&D activities.**
- **R&D specific incentives:**
  - Innovation box: 5% effective tax rate on result of the income derived from IP
  - R&D allowance (WBSO): compensation for R&D labor costs
  - RDA: seeks to reduce companies' R&D operating costs and investments in R&D assets
  - Innovation loan

and

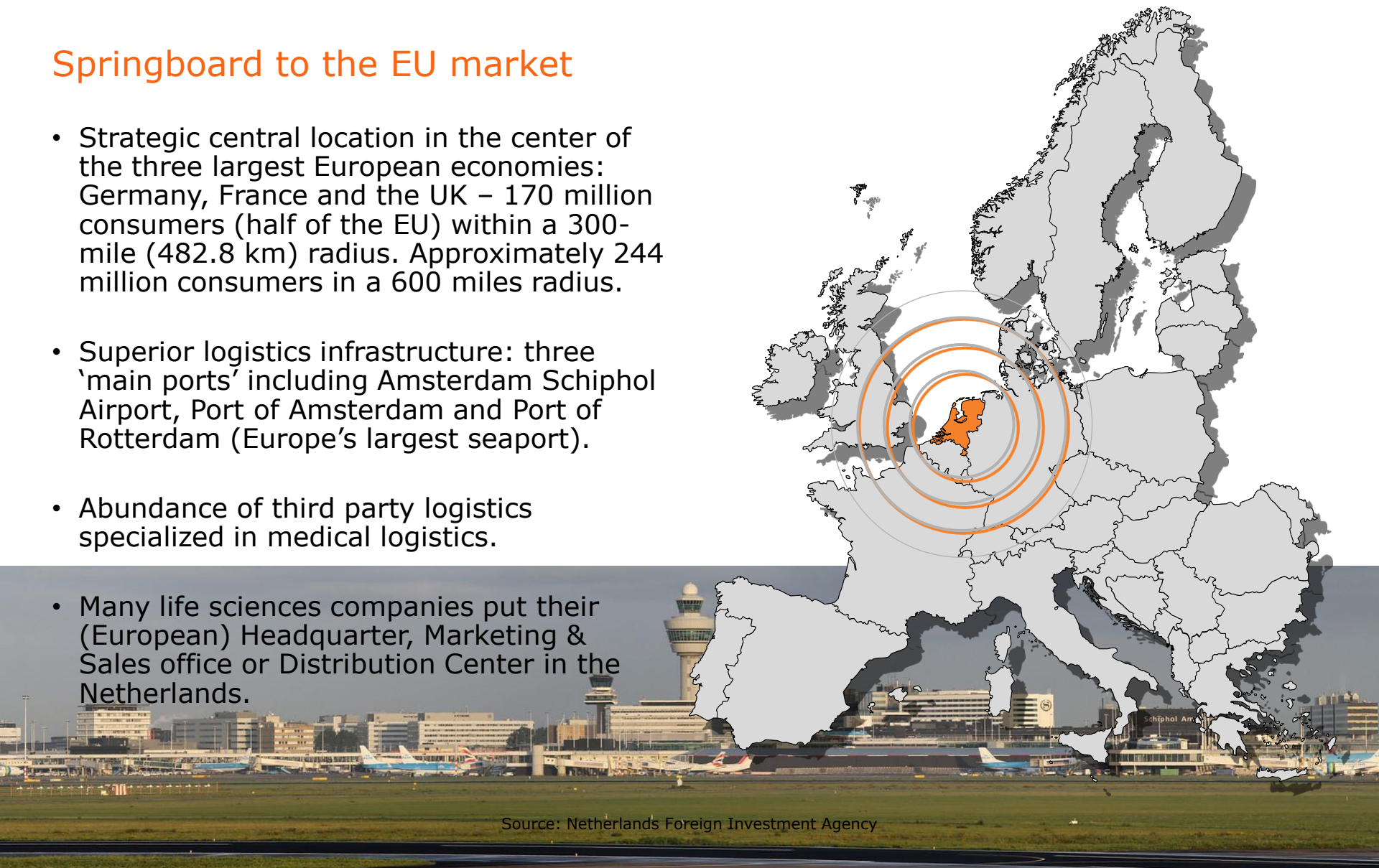
- Relatively low statutory corporate income **tax rate of 25%** (20% for first 200,000 Euro)
- Possibility of obtaining **advance tax rulings (ATR)** and / or **Advance Pricing Agreements (APR)** from the Dutch tax authorities giving certainty on future tax position
- Extensive **worldwide tax treaty network** (over 95 countries) to avoid double taxation and reducing withholding taxes on dividends, interests and royalties (for interest and royalties often to 0%)
- Favorable tax treatment for expats (**30% tax ruling**)
- **VAT deferment upon import**: no upfront payment of VAT and **Bonded warehousing**.

Source: Netherlands Foreign Investment Agency

The Netherlands: entry market to the EU

Springboard to the EU market

- Strategic central location in the center of the three largest European economies: Germany, France and the UK – 170 million consumers (half of the EU) within a 300-mile (482.8 km) radius. Approximately 244 million consumers in a 600 miles radius.
- Superior logistics infrastructure: three 'main ports' including Amsterdam Schiphol Airport, Port of Amsterdam and Port of Rotterdam (Europe's largest seaport).
- Abundance of third party logistics specialized in medical logistics.
- Many life sciences companies put their (European) Headquarter, Marketing & Sales office or Distribution Center in the Netherlands.



Source: Netherlands Foreign Investment Agency

Other reasons to invest in The Netherlands

Highly educated, multilingual and flexible workforce

The Netherlands features one of the most highly educated, flexible and motivated workforces in Europe. Dutch professionals are also among the most multilingual in the world.

International business environment

An international outlook and openness to foreign investment is firmly engrained in the Dutch culture.

Excellent quality of life

The Netherlands has a high standard of living, while the costs of living, housing, education and leisure are lower than in most Western-European countries.

Utrecht: Europe's most competitive region in the EU's 2013 Regional Competitiveness Ranking.

Eindhoven: Forbes Magazine describes Eindhoven as "hands-down the most inventive city in the world based on patent intensity."

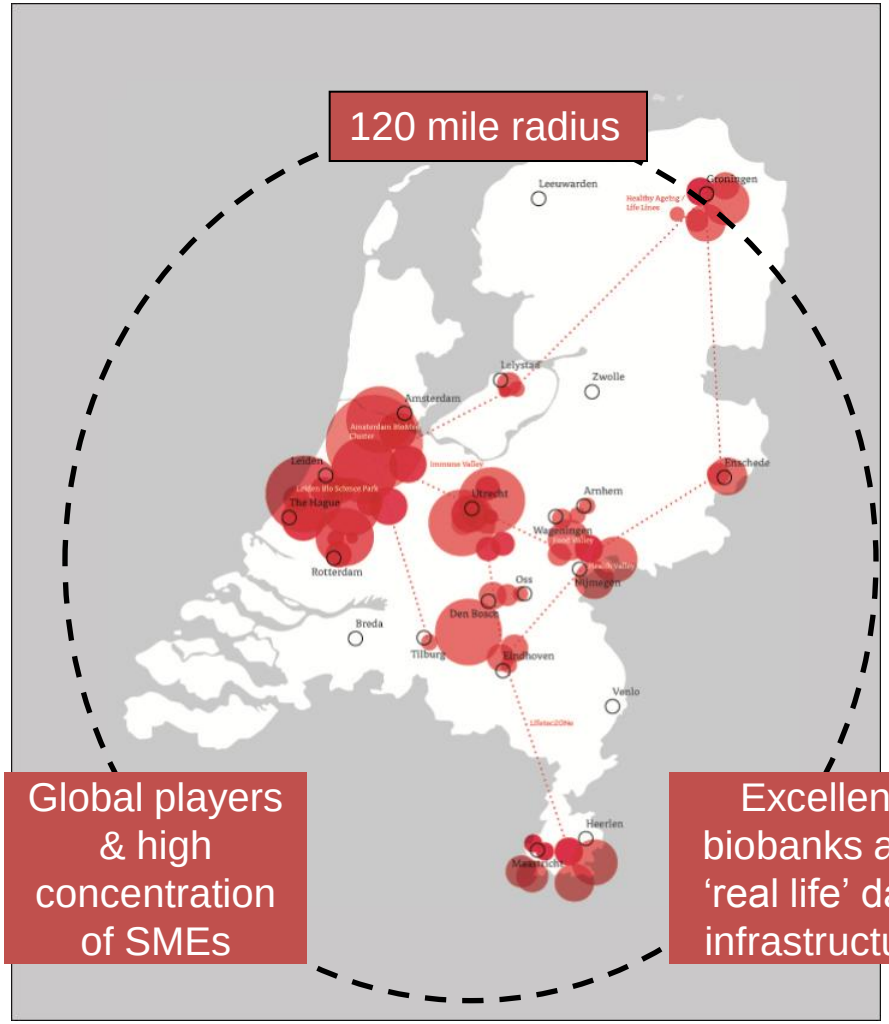
Source: Netherlands Foreign Investment Agency

The Dutch Life Sciences cluster

Knowledge base

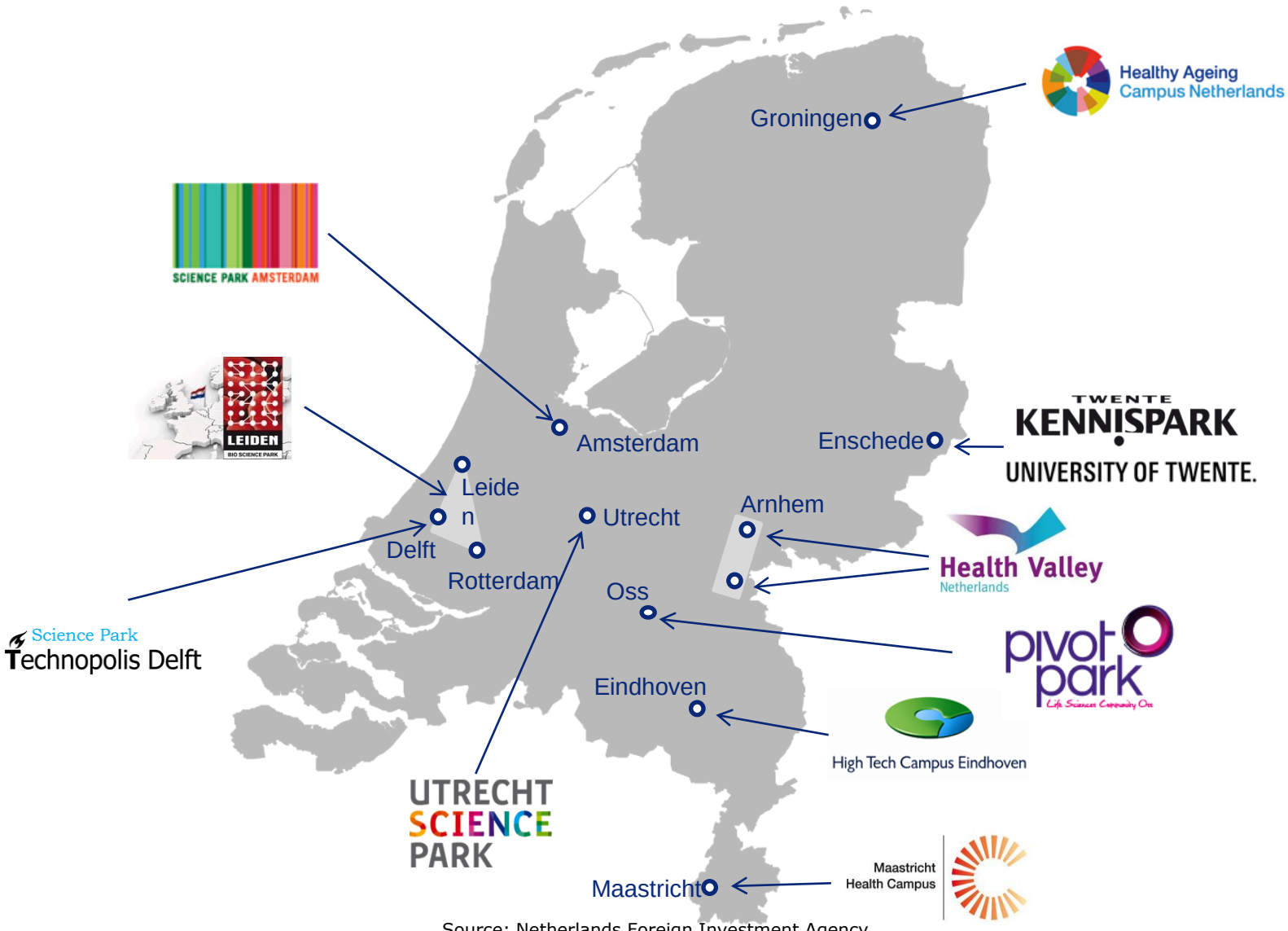
Integrated life sciences innovation
First rate academia, hundreds of SMEs and global players in med-/biotech and pharma within a 120
mile radius.

Focal points
- Amsterdam
- Delft
- Eindhoven
- Enschede
- Groningen
- Leiden
- Maastricht
- Nijmegen
- Oss
- Rotterdam
- Utrecht
- Wageningen



Source: Netherlands Foreign Investment Agency

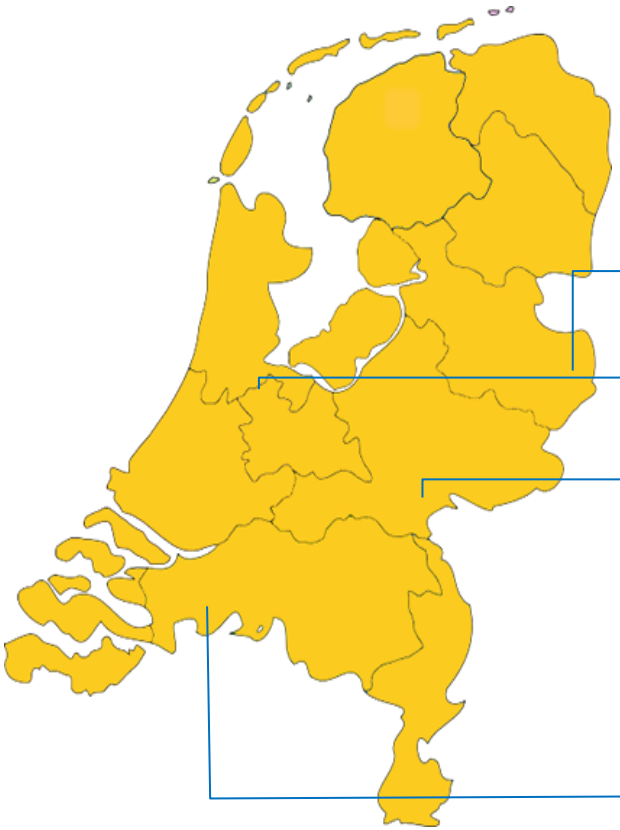
The Dutch Life Sciences parks



Source: Netherlands Foreign Investment Agency

Education institutes with special attention for health logistics

DINALOG Dutch Institute for Advanced Logistics



University of Twente

University Amsterdam

Knowledge Distribution Centre Arnhem:
Cure circle: platform of hospitals, healthcare institutes and Universities of Applied Sciences focusing on healthcare logistics

University of Applied Sciences Breda (NHTV)

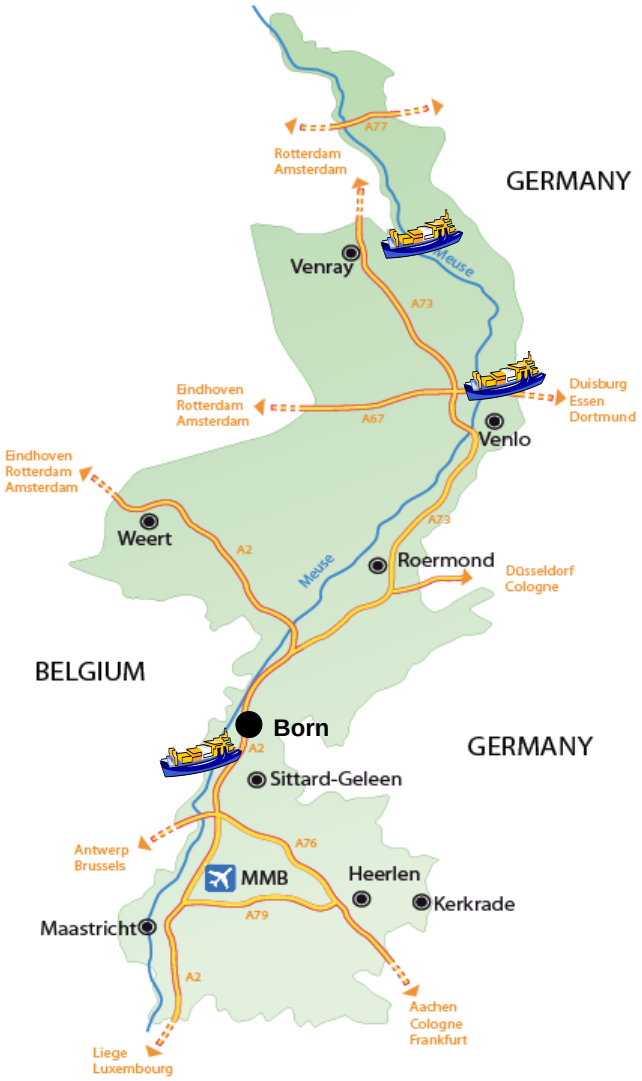
Regions


THE NETHERLANDS
NORTH SEA
Wadden Sea
Ems
Delfzijl
GRONINGEN
Groningen
Leeuwarden
FRIESLAND
Assen
Heerenveen
DRENTHE
Emmen
Den Helder
NORTH HOLLAND
IJsselmeer
FLEVO
Alkmaar
Markermeer
Lelystad
Zwolle
Zaanstad
LAND
OVERIJSSEL
Almelo
Haarlem
AMSTERDAM
Almere
Apeldoorn
Enschede
Katwijk
Leiden
Hilversum
Utrecht
Amersfoort
The Hague / 's-Gravenhage
SOUTH
UTRECHT
GELDERLAND
Amhem
IJssel
Lek
Nether Rhine
Delft
Rotterdam
Haringvliet
HOLLAND
Merwede
Waal
Dordrecht
Nijmegen
's-Hertogenbosch
Meuse
Rhine
Eastern Schelde
NORTH BRABANT
Breda
Tilburg
Middelburg
Flushing
ZEALAND
Eindhoven
Venlo
Western Schelde
Antwerp
LIMBURG
Schelde
Meuse
BELGIUM
GERMANY
Maastricht
Heerlen
Provincial capitals in red

Limburg: access to markets Germany, France, UK, Benelux

Source: LIOF

Limburg: top location for serving EU market



Limburg, 3rd major logistics area after main ports Rotterdam and Amsterdam

Elected past years as the best NL logistics region

- 2 million m^2 warehouse space
- 300 ha greenfield area available logistic operations
- High concentration of 3PL's and European Distribution Centres
- > 1500 Transport & Logistics Companies
- 20,000 logistics professionals employed
- Specialized courier services & community of cell-tissue handling expertise

Unique feature -> located right at German border:

- saving distribution time + costs
- local post / freight tariffs possible
- proximity of road & air hubs of UPS, DHL, Fedex, TNT (within 30-60 min.) allows late cut off times
- Cross-border workforce potential

Source: LIOF

Limburg: at the heart of integrator hubs

Integrator hubs of global express couriers within 30-60 minutes
(allows for late cut off times!)

Source: LIOF

Limburg: references EDC's Life Sciences & Health

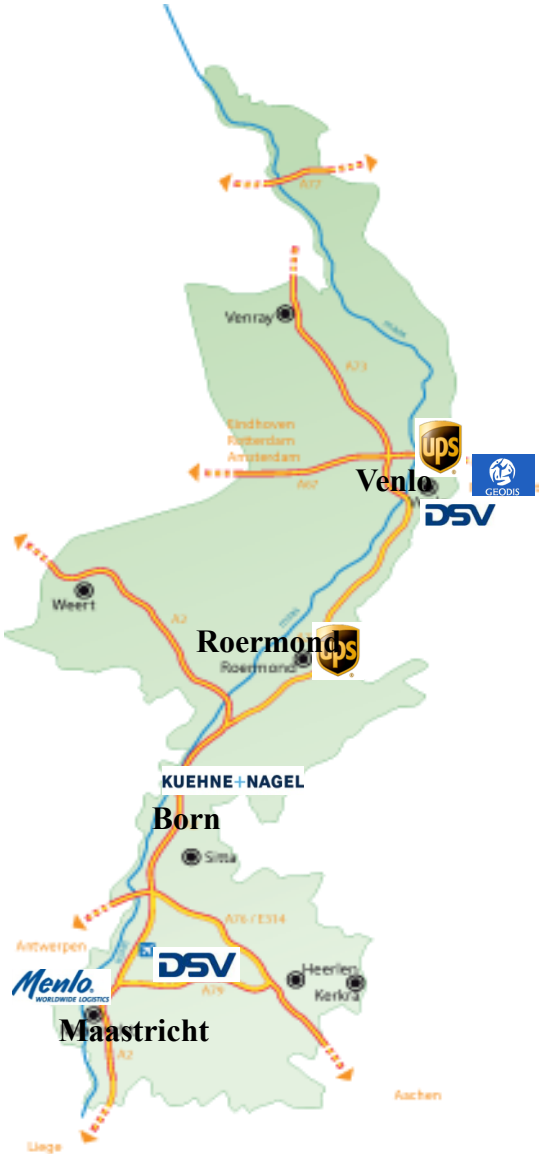
Abbott A Promise for Life	EMEA Distribution Center: Customer Service, Logistics, Operations, Quality Assurance and Finance	140 empl.
ACIST Contrast Delivery Systems	Logistics, Warehousing and Customer Service	60 empl.
Boston Scientific	EDC cardiovascular devices. SSC: European HR, IT, partly Finance. Coordination Clinical Research for minimal invasive	350 empl.
COVIDIEN positive results for life	EMEA distribution center	15 empl.
Argus imaging	Design and production X-ray image intensifiers en CT scanners	80 empl.
Bayer HealthCare Radiology	EDC, Sales & Marketing, Service & Repair medical devices	60 empl.
Medtronic	3 Locations: R&D/Clinical Research, European Operations Center (EDC + SSC), Assembly Operation pulmonary devices	1100 empl.
MEDIVATORS A Cantel Medical Company	EHQ, sterilants, water purification products, dialysis solutions	35 empl.
MERIT MEDICAL	EHQ, EMEA Distribution & Warehousing, Customer Service	50 empl.
Oliver-Tolas Healthcare Packaging	R&D, manufacturing adhesive coatings,sterile grade packaging materials	25 empl.
PHYSIO CONTROL	EDC and operations defibrillation technology	30 empl.
stryker	EDC orthopedic implants for knee, hip and spine	75 empl.
esaote	EDC, R&D, product development, manufacturing, ultrasound systems	150 empl.

Source: LIOF

Limburg: references Life Sciences & Health

Source: LIOF

Limburg: references 3PL's Life Sciences & Health



Warehouse space > 140,000m2

65,000m2

55,000m2

10,000m2

5,000m2

5,000m2

Source: LIOF

Limburg: international labor market

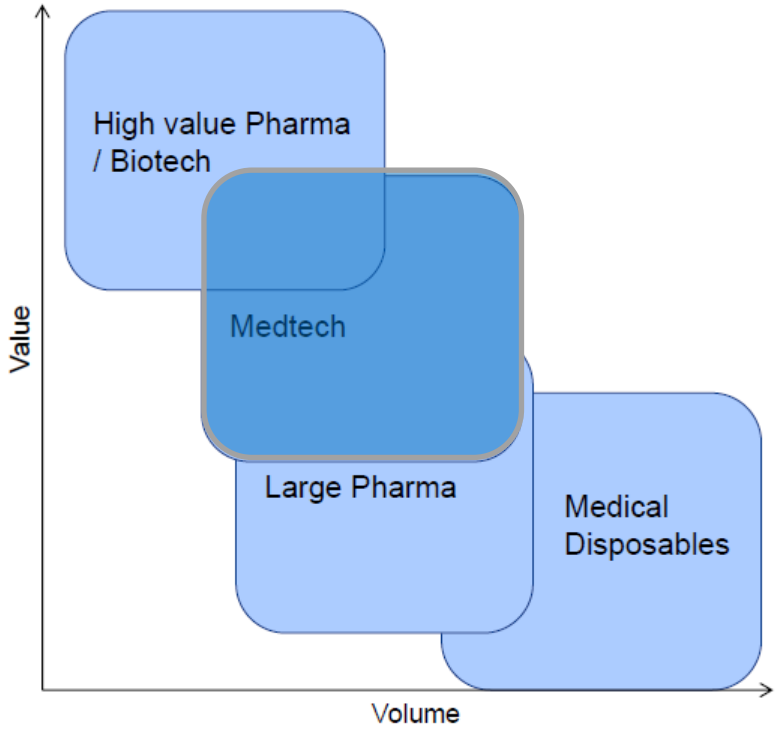
- Sourcing staff in 3 Countries: NL-BE-GER
- 3.8 mln inhabitants of which 1.2 mln Dutch
- Multilingual: Dutch, German, French, English, Mediterranean
- Labor Force of 1.7 million flexible and highly-qualified staff

Source: LIOF

Medical technology (medtech)

Medtech: characteristics

Segmentation

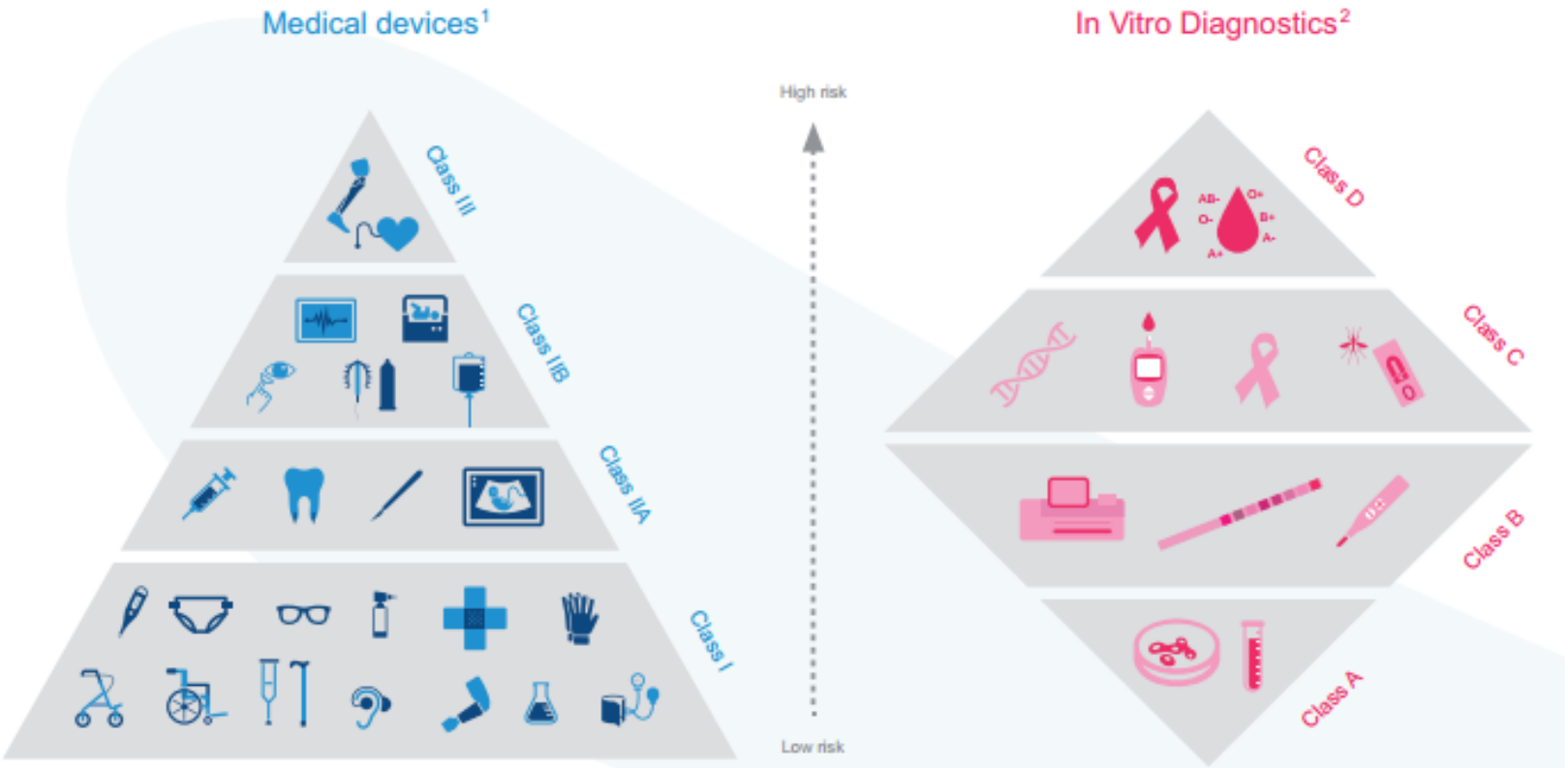


Supply chain characteristics

Elements	High value pharma / biotech	Large Pharma	Medtech	Medical Disposables
Value density	++ / +++	- / +	++ / +++	-
Volume	-	++	-	++ / +++
Order to delivery leadtime (EU)	Next-day	Next-day – 72 hours	Next-day (pre-x)	Next-day – 72 hours
Temp control importance	+++	++	+	0 / +
Distribution profile	Parcel	Pallet	Parcel	Pallet
Level of country-specific SKUs	+++	++	+++	+ / ++
Main commercial channel	Mix Direct/Indirect	Indirect	Direct	Mix Direct/Indirect

Source: Buck Consultants International

Medtech: diversity and classification



1 European Commission. The classification of medical devices is a 'risk based' system based on the vulnerability of the human body taking account of the potential risks associated with the devices. The classification rules are based on different criteria such as the duration of contact with the patient, the degree of invasiveness and the part of the body affected by the use of the device.

2 European Commission. IVD classification is based on the degree of health risk posed to an individual and public, and is related to the risk of an incorrect result arising from the use of the IVD.

Source: MedTech Europe – The European Medical Technology industry in figures

Medtech: product categories

There are more than 500,000 medical technologies registered. These fall within 16 categories of products, as determined by the Global Medical Devices Nomenclature (GMDN) Agency.

CODE	CLASSIFICATION	EXAMPLE
01	Active implantable technology	Cardiac pacemakers, neurostimulators
02	Anaesthetic and respiratory technology	Oxygen mask, gas delivery unit, anaesthesia breathing circuit
03	Dental technology	Dentistry tools, alloys, resins, floss, brushes
04	Electromechanical medical technology	X-ray machine, laser, scanner
05	Hospital hardware	Hospital bed
06	In vitro diagnostic technology	Pregnancy test, genetic test, glucose strip
07	Non-active implantable technology	Hip or knee joint replacement, cardiac stent
08	Ophthalmic and optical technology	Spectacles, contact lenses, intraocular lenses, ophthalmoscope
09	Reusable instruments	Surgical instruments, rigid endoscopes, blood pressure cuffs, stethoscopes, skin electrodes
10	Single use technology	Syringes, needles, latex gloves, balloon catheters
11	Technical aids for disabled	Wheelchairs, walking frames, hearing aids
12	Diagnostic and therapeutic radiation technology	Radiotherapy units
13	Complementary therapy devices	Acupuncture needles/devices, bio-energy mapping systems/software, magnets, moxibustion devices, suction cups
14	Biological-derived devices	Biological heart valves
15	Healthcare facility products and adaptations	Gas delivery systems
16	Laboratory equipment	Most IVD which are not reagents

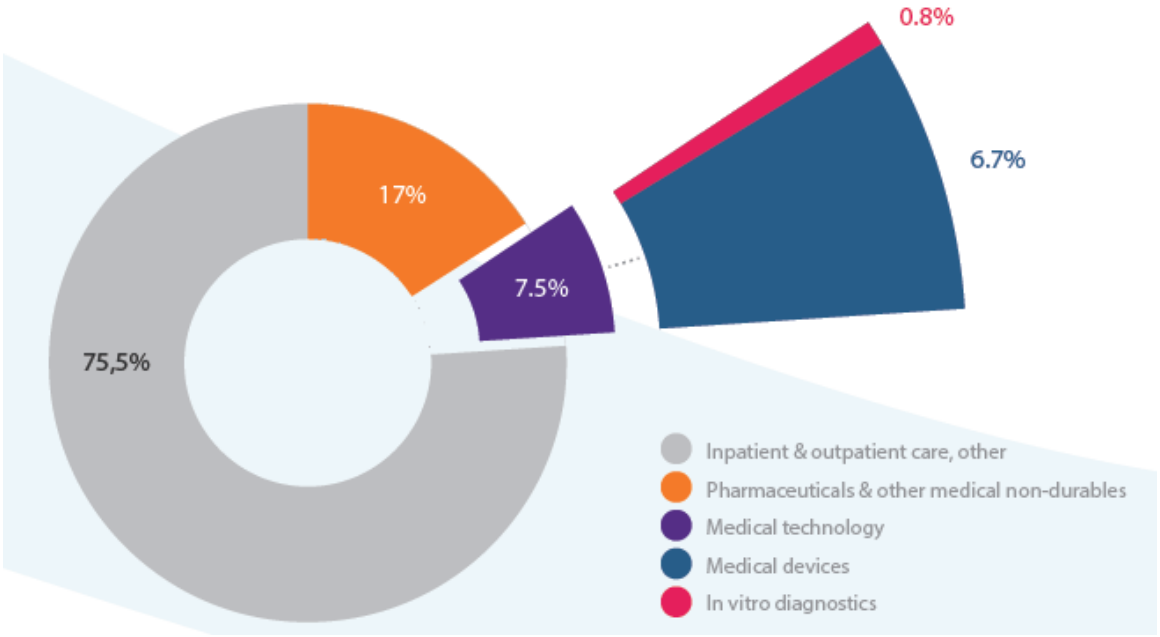
Source: MedTech Europe – The European Medical Technology industry in figures

Medtech: facts & figures

In Europe, an average of 10.4% of gross domestic product is spent on healthcare. Of this figure, around 7.5% is attributed to medical technologies. The spending on medical technology varies significantly across European countries, ranging from around 5% to 10% of the total healthcare expenditure.

Expenditure on medical technology per capita in Europe is at around €195 (weighted average), compared with €380 in the US.

Breakdown of total healthcare expenditure in Europe

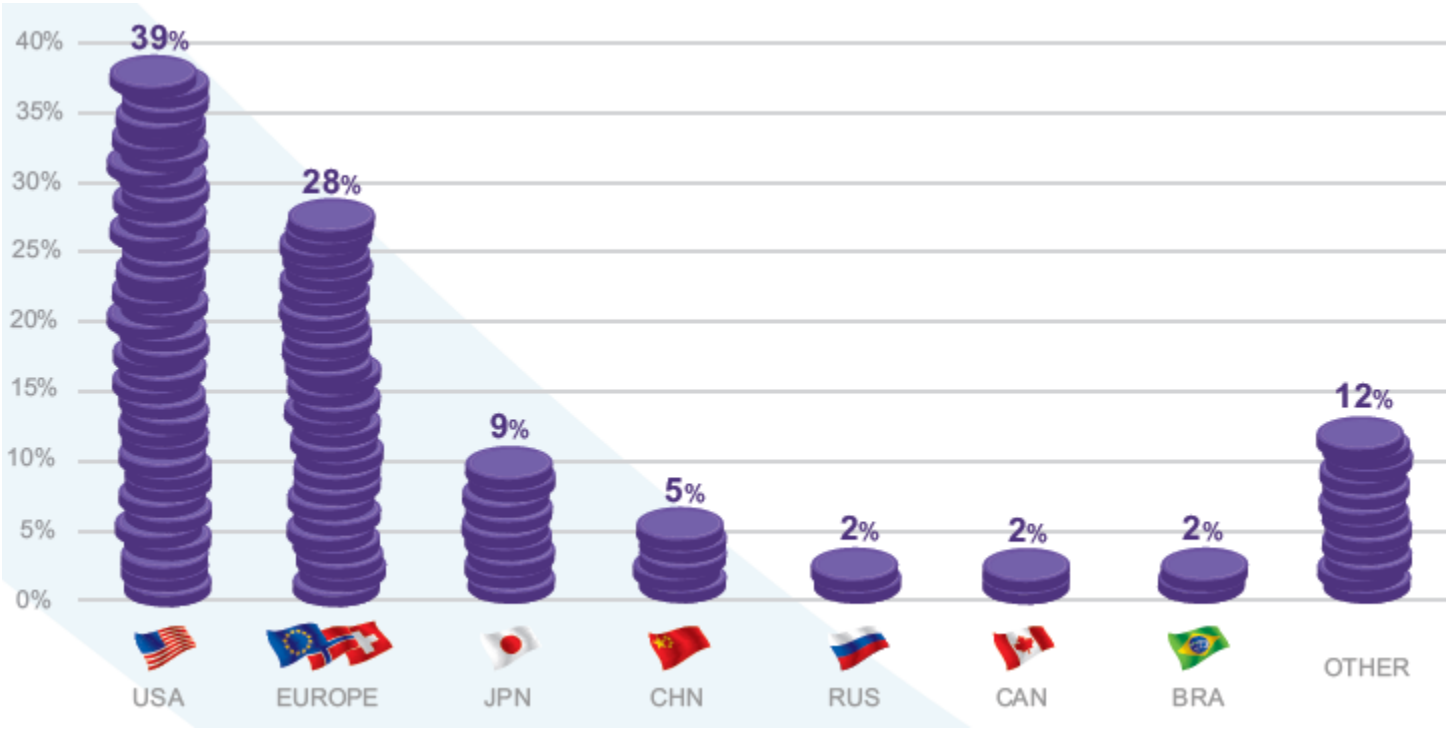


Source: MedTech Europe – The European Medical Technology industry in figures

Medtech: facts & figures

The European medical technology market is estimated at roughly €100 billion.

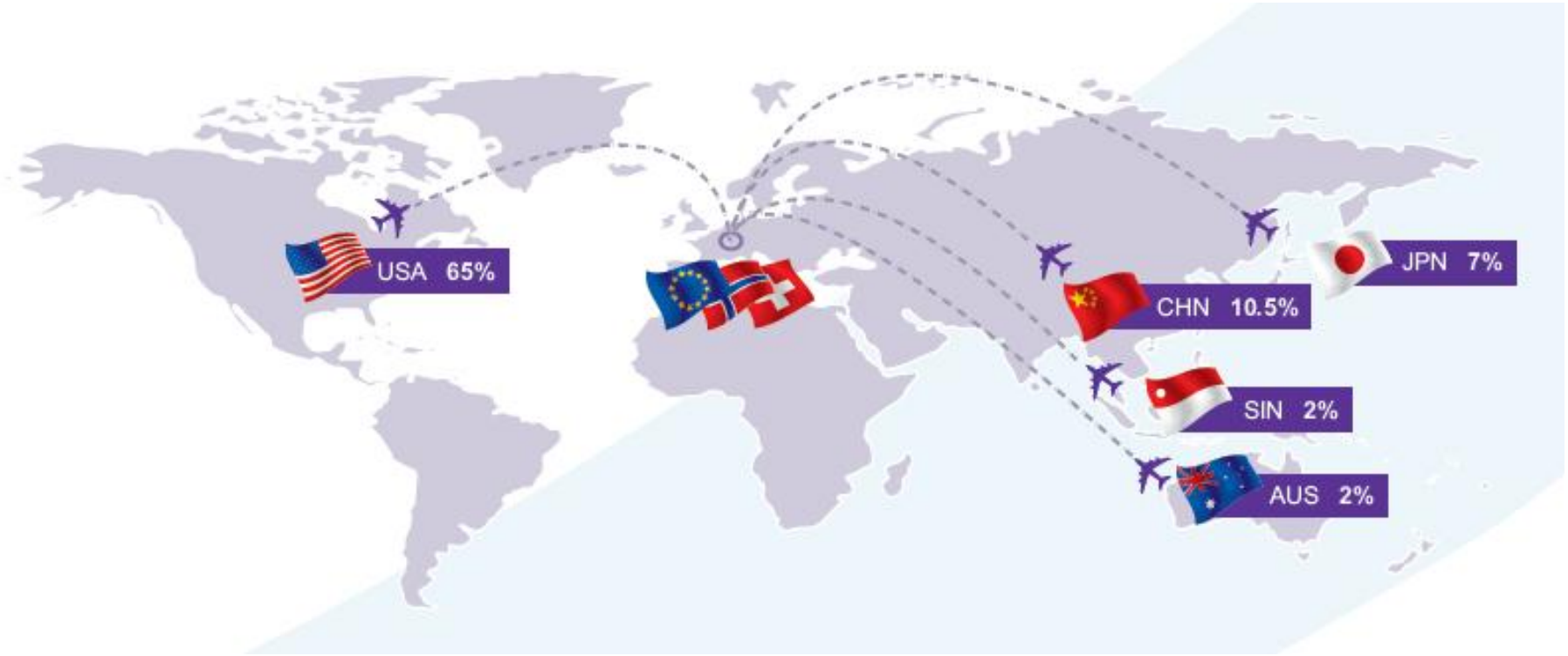
Based upon manufacturer prices the European medical technology market is estimated to comprise approximately 28% of the world market. It is the second largest medical technology market after US (~40%).



Source: MedTech Europe – The European Medical Technology industry in figures

Medtech: facts & figures

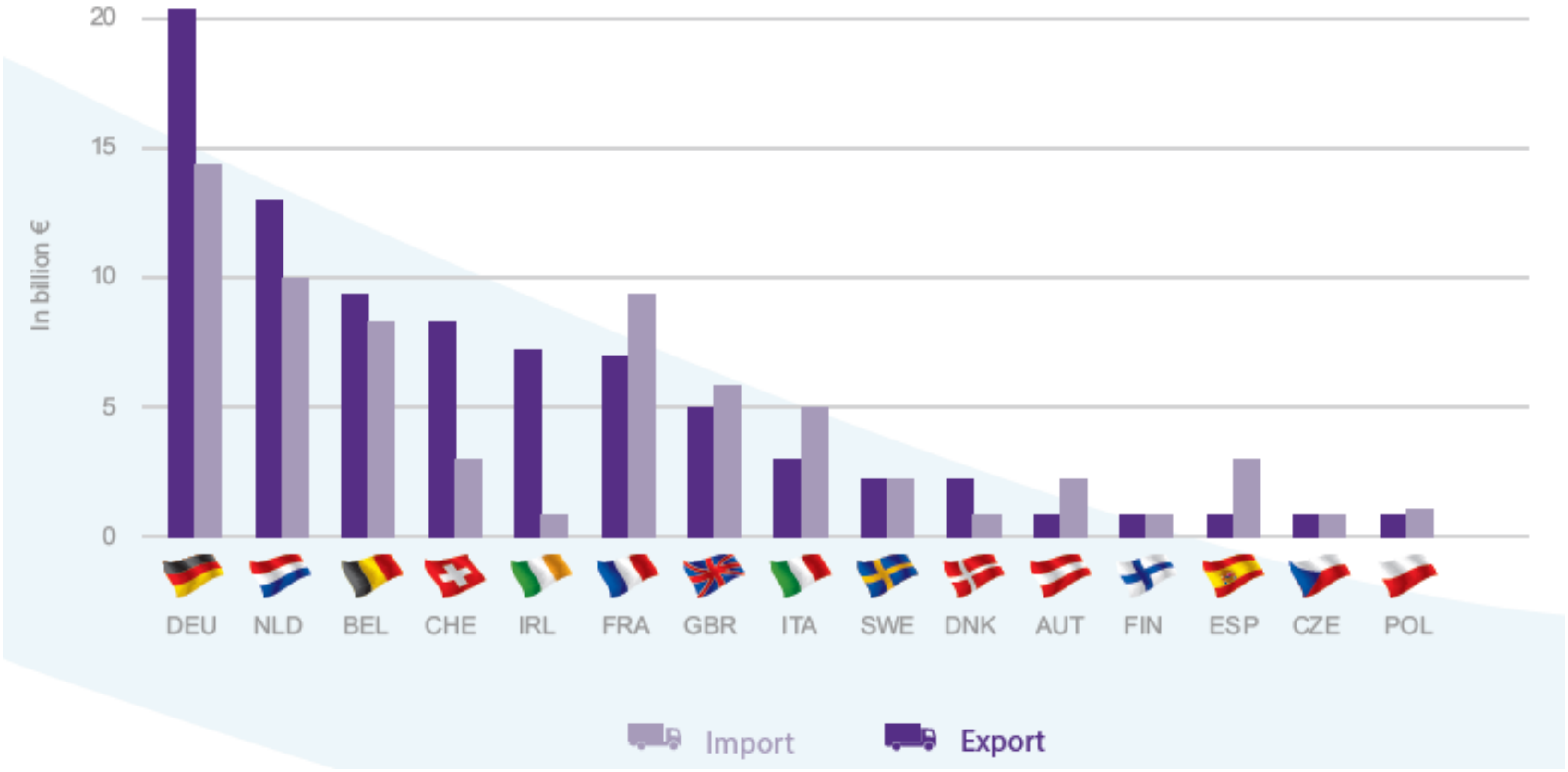
Top suppliers to European medical technology market (imports), 2012



Source: MedTech Europe – The European Medical Technology industry in figures

Medtech: facts & figures

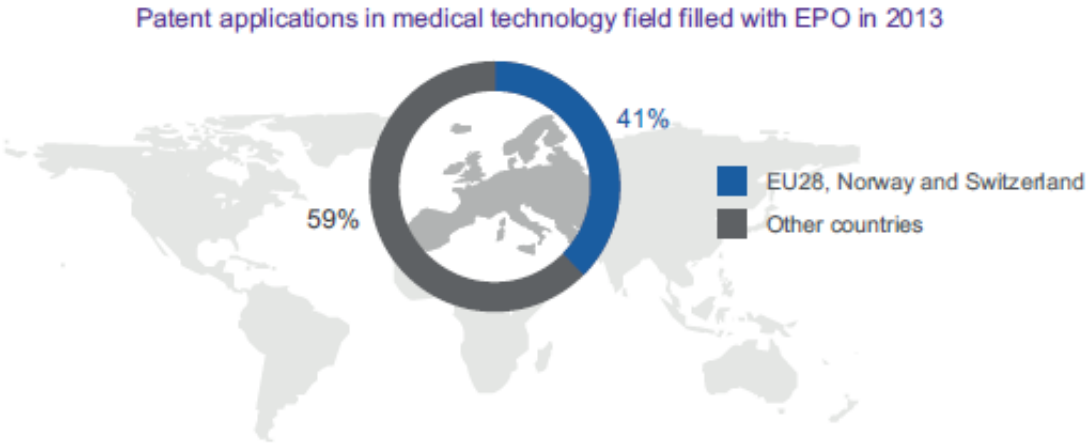
Exports & imports of medical technology by country, 2013



Source: MedTech Europe – The European Medical Technology industry in figures

Medtech: facts & figures

In 2013, more than 10,000 patent applications were filed with the European Patent Office (EPO) in the field of medical technology – equivalent to 7 % of the total number of applications – more than any other technical field. 41% of these patent applications were filed from European countries (EU28, Norway and Switzerland) and 59% from other countries, with the majority of applications filed from US (39%).



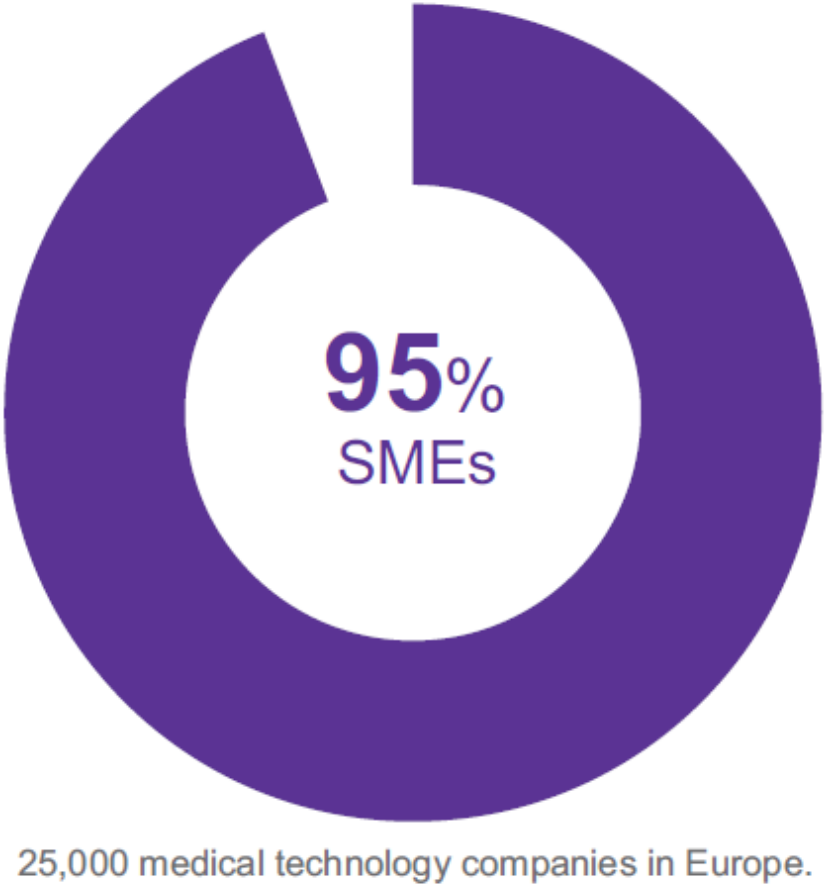
Source: MedTech Europe – The European Medical Technology industry in figures

Medtech: facts & figures

- The European medical technology industry employs more than 575,000 people. Germany has the highest absolute number of people employed in the medical technology sector, while the number of medtech employees per capita is highest in Switzerland and Ireland. This high level of employment shows that the medical technology industry is an important player in the European economy.
- In comparison, the US medical technology industry employs around 520,000 people while the European pharmaceutical industry employs 675,000 people.

Source: MedTech Europe – The European Medical Technology industry in figures

Medtech: facts & figures



- There are almost 25,000 medical technology companies in Europe.
- Most of them are based in Germany, followed by the UK, Italy, Switzerland, Spain and France.
- Small and medium-sized companies (SMEs) make up almost 95% of the medical technology industry, the majority of which employ less than 50 people (small and micro-sized companies).

Source: MedTech Europe – The European Medical Technology industry in figures

Medtech: trends & developments

- **Pricing pressure** is mounting in Europe as governments grapple with burgeoning health care bills, and more and more players demand evidence that products are worth the cost. And while these trends have been at work for years, the recent economic crisis has accelerated the pace and intensified the impact.
- The combination of **intensifying competition** and **regulatory pressure** will further strain the existing medtech model.
- **Innovation**, a key driver of industry growth and performance over the past decade, is likely to be **less robust** in the years ahead.
- Our analyses show that the convergence of pricing, regulatory, and other market forces could lead to the deteriorating performance of the European medtech industry in the years ahead – compelling companies to **do more with less**.
- In order to maximize the opportunity in within the existing business, medtech companies must **transform their commercial model** and **built best-in-class commercial capabilities**.
- Companies must address the **shift towards value-based health care**. The right strategy can turn this trend into a tailwind for the business.
- To fund the journey, a significant opportunity exists for medtech players to **improve their cost structure**.
- In addition to maximizing the opportunity that is found in the existing model, medtech companies in Europe must also change their game. A key element of this is to **reinvent the innovation process**, building on best practices observed among high-performing companies.
- There are tremendous potential rewards for companies that look for ways to "expand their playground" and **move beyond their existing business definition**.
- Changing the game also calls for **exploring true low-cost opportunities**.

Source: Slow burn – the need to transform the medtech model in Europe – The Boston Consulting Group and MedTech Europe

Medtech: trends & developments

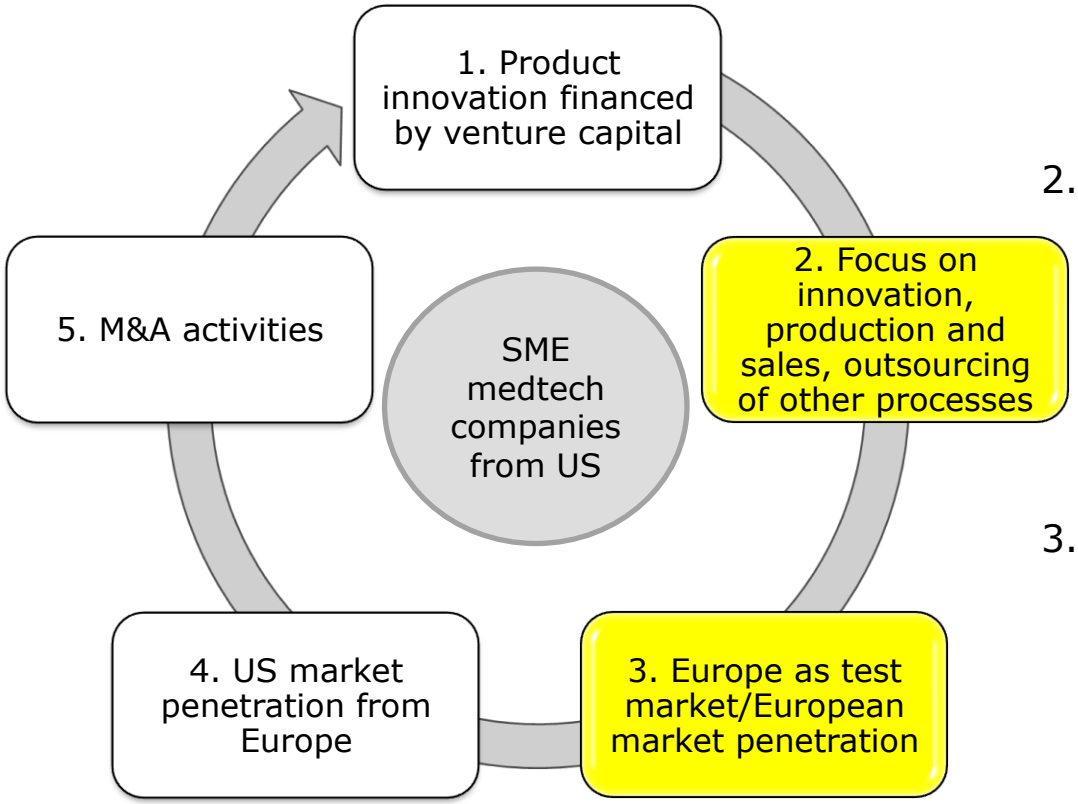
Reduce costs
Increase profitability

Flexibility
(responsiveness + agility)

New geographic markets

Source: Buck Consultants International

Medtech: HIDC observations



2. Focus on core processes driven by venture capitalists, non-core processes like supply chain are outsourced

3. Europe (frequently Benelux and/or Nordics) is used as test market for a number of reasons:
    1. CE-marking relatively easy and fast compared to FDA approval
    2. ACA domestic medical devices tax (2.3%) in US
    3. Reimbursement in Europe
    4. International tax planning (IP)

Medtech: ISO 13485

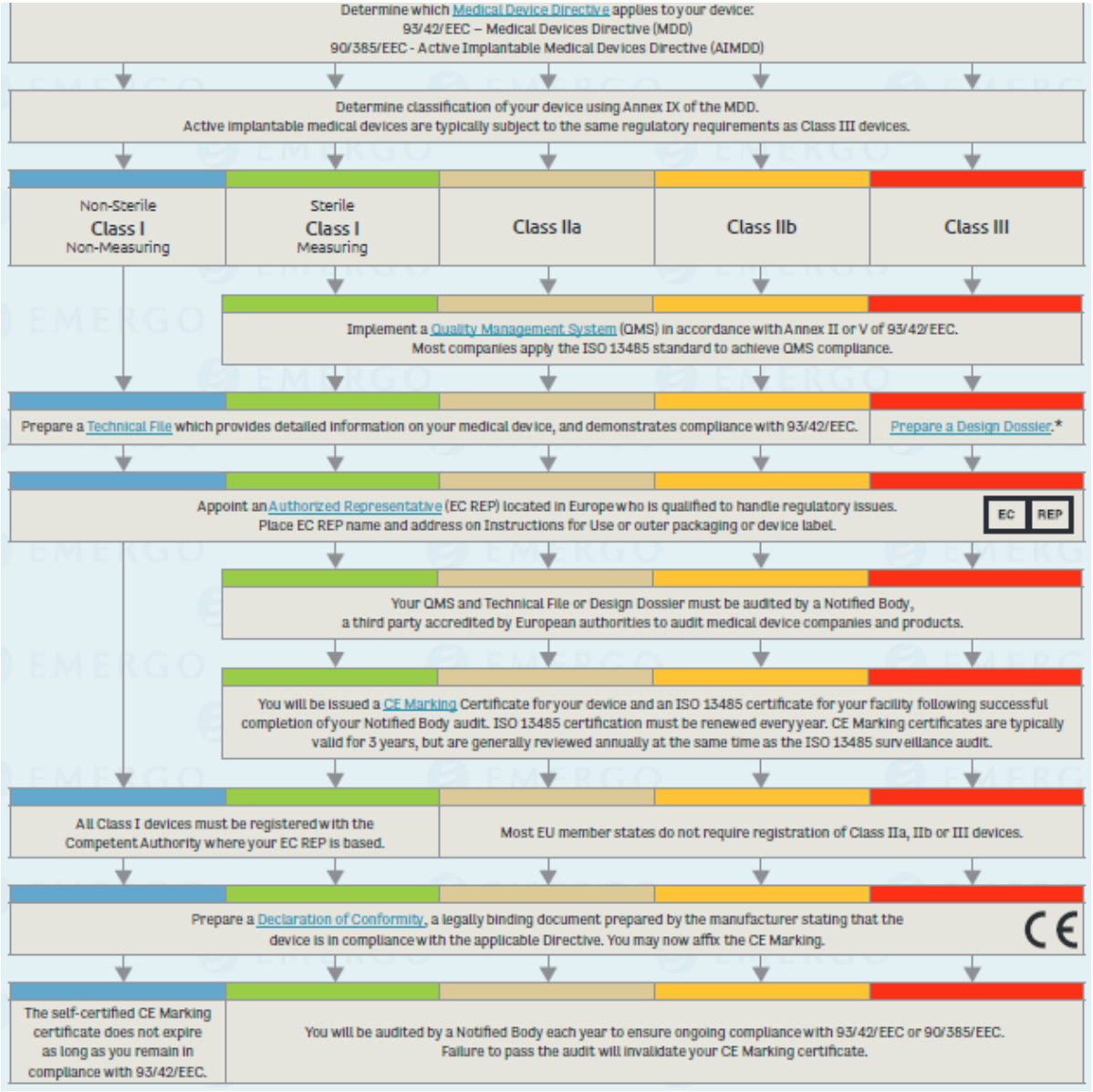
- ISO 13485:2003 specifies requirements for a **quality management system** where an organization needs to demonstrate its **ability to provide medical devices and related services that consistently meet customer requirements and regulatory requirements applicable to medical devices and related services**.
- The primary objective of ISO 13485:2003 is **to facilitate harmonized medical device regulatory requirements for quality management systems**. As a result, it includes some particular requirements for medical devices and excludes some of the requirements of ISO 9001 that are not appropriate as regulatory requirements. Because of these exclusions, organizations whose quality management systems conform to this International Standard cannot claim conformity to ISO 9001 unless their quality management systems conform to all the requirements of ISO 9001.
- All requirements of ISO 13485:2003 are **specific to organizations providing medical devices**, regardless of the type or size of the organization.
- If regulatory requirements permit exclusions of design and development controls, this can be used as a justification for their exclusion from the quality management system. These regulations can provide alternative arrangements that are to be addressed in the quality management system. It is the responsibility of the organization to ensure that claims of conformity with ISO 13485:2003 reflect exclusion of design and development controls.
- If any requirement(s) in Clause 7 of ISO 13485:2003 is(are) not applicable due to the nature of the medical device(s) for which the quality management system is applied, the organization does not need to include such a requirement(s) in its quality management system.
- **The processes required by ISO 13485:2003, which are applicable to the medical device(s), but which are not performed by the organization, are the responsibility of the organization and are accounted for in the organization's quality management system.**

Source: ISO

Medtech: ISO 13485

ISO 13485 certified logistic service providers in HIDC network

Medtech: European regulatory process



Source: Emergo

Medtech: European regulatory process

Device classification in Europe	How long you should expect to wait after submission until approval is granted. (See note 1)	Validity period for CE Marking certificate. (See note 2)	Registration renewal should be started this far in advance. (See note 3)	Complexity of the registration process for this classification. (See note 4)	Overall cost of gaining regulatory approval. (See note 5)
CLASS I * Non-sterile, non-measuring	<1 month	Does not expire	Not applicable	Simple – Complex	Low – High
CLASS I Sterile, measuring	3-5 months	3 years	2 months	Simple – Complex	Low – High
CLASS IIa	3-5 months	3 years	2 months	Simple – Complex	Low – High
CLASS IIb	3-6 months	3 years	2 months	Simple – Complex	Low – High
CLASS III	6-9 months	3 years	2 months	Simple – Complex	Low – High

NOTE 1: The time frames shown above are typical for the majority of medical device submissions but assume that your device does not contain animal tissue, medicinal substances or employ entirely novel technology. Your length of approval will depend on the quality and completeness of your technical documentation and how much time you take to address additional information requests from authorities after submission. YOUR SUBMISSION(S) MAY TAKE MORE TIME THAN WHAT IS SHOWN ABOVE.

NOTE 2: CE Marking certificates are typically valid for 3 years, but are generally reviewed annually at the same time as the ISO 13485 surveillance audit. They remain valid as long as you do not make changes to the device, intended use or indications for use. Failure to pass your annual audit could invalidate your CE Marking certificate.

NOTE 3: Most CE Marking certificates are valid for 3 years, and you do not need to "re-register" your device in Europe. However, your Notified Body will conduct an annual compliance audit and could invalidate your device CE certificate if you are found to be out of compliance. Your Notified Body will reissue your CE certificate every three years. We recommend starting the preparations for your annual audit no later than the time specified above. Please consult with your regulatory expert well before this suggested time to avoid any lapse in your registration.

NOTE 4: Our rating of the complexity of the registration process is based on our experience and the opinion of nearly 1,000 QA/RA professionals worldwide who were asked to rate the difficulty of registering a device in each country in January 2014. The European CE Marking process is considered the mid-point to which all other markets are compared.

NOTE 5: Low = Less than US$5000; Midpoint = US$15000-$30000: High = More than US$50000. Overall cost includes registration application fees, product testing, in-country representation, submission preparation consulting and translation of registration documents but not IFU. Costs assume you already have approval for your device in the United States, Canada or Japan. Does not include cost of product testing, nor implementing, auditing, or updating a quality management system compliant with ISO 13485, if applicable.

* Class I devices which are not provided sterile and which do not have a measuring function can be self-certified (self-declared). As such you will be able to sell your product in Europe within one week of submitting the necessary paperwork to the Competent Authority in which your European Authorized Representative is based, once the requirements of the applicable directive have been met.

Source: Emergo

Medtech: indirect taxes

Import duties

- EU import duties on medtech are frequently 0%
- Actual percentages depend on tariff code and origin

VAT

- Import VAT on medtech in The Netherlands can be 6% or 21% depending on the classification of the product
- Other EU countries can have different import VAT percentages than The Netherlands
- It is possible to have a neutral cash flow in relation to import VAT administration in The Netherlands
- VAT on intra-community (EU) transactions differs per type of transaction (business-to-business, business-to-hospital, business-to-patient/consumer) and Inco-term

HIDC highly recommends to make use of specialized advisors in order to structure a tax effective supply chain.

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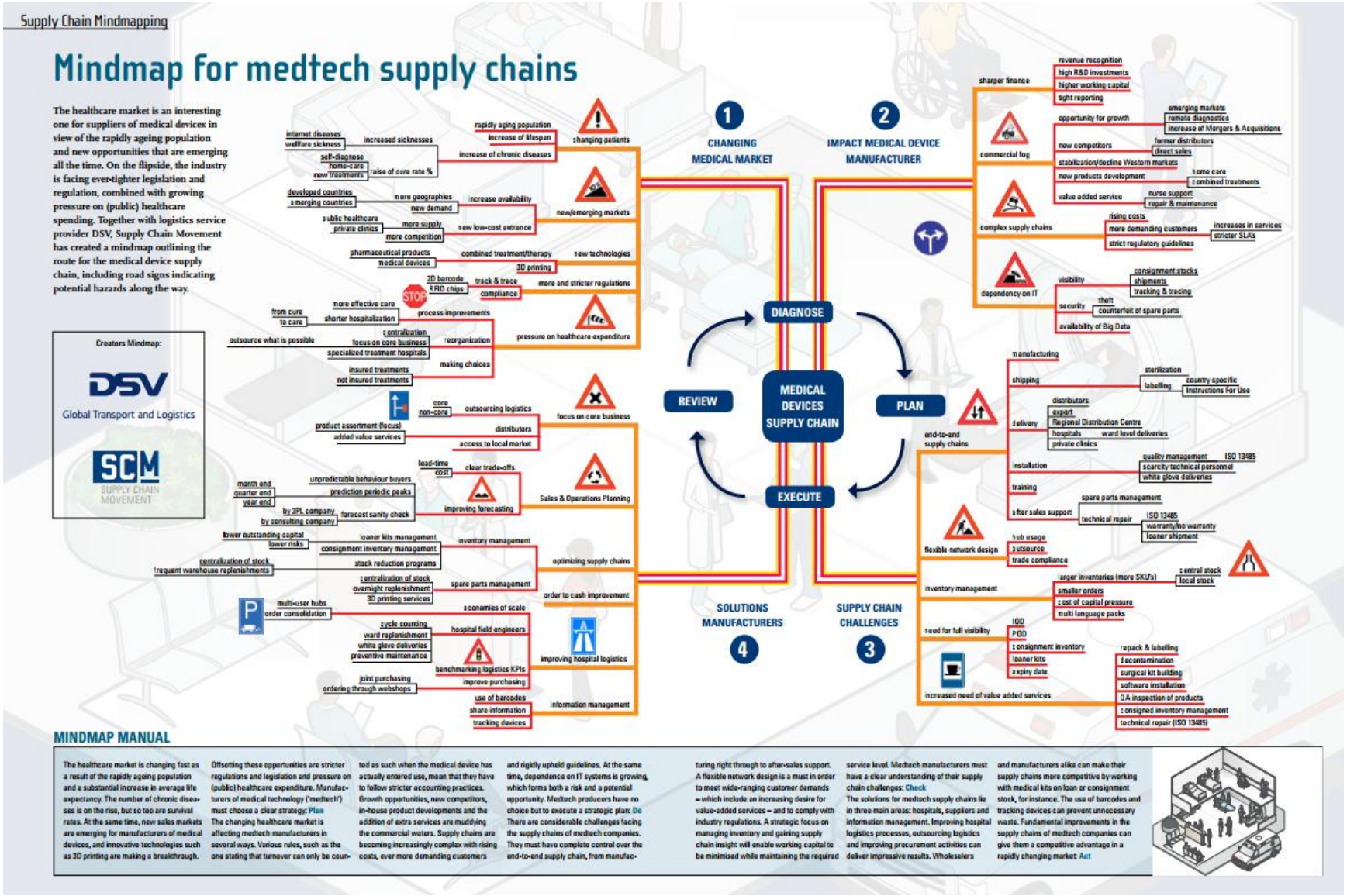
Medtech: supply chain



Medtech: supply chain

Centralization of Supply Chain Control	• Common Practice for many years
Network Consolidation	• Common Practice for many years
Visibility	• Control Tower / Transport Management concepts • Linking inbound, intercompany and secondary distribution • Information is Key
Outsourcing & Partner Portfolio Reduction	• Main DCs still often insourced (at least at the big players) • Development towards outsourcing observed
Customer Service / Order to Cash process harmonization	• CS/O2C mainly in-house • Increasing interest in outsourcing and centralization of back-offices
Supply Chain Differentiation	• From one size fits all to differentiated supply chains per product/market combination • SC becoming a stronger counterpart for the commercial team, challenging service requirements
Supply Chain Collaboration	• Logistics not a key differentiator, therefore the industry is recognizing the opportunities of collaboration • How to break through from pilots to full realization?

Source: Buck Consultants International

Medtech: supply chain services

Logistics, fulfilment, distribution, value added, financial and customer services include:

- 4PL
- analyses and testing
- assembly/configuration
- build surgical kits
- build, pack to order
- carrier management
- clean room storage
- cleaning & refurbishment
- client inquiries including order taking
- consignment stock
- customs clearance
- dust free shelf storage
- expiry dates control
- fiscal representation
- import/export handling
- Intrastat reporting
- inventory management
- KPI & business indicator reporting
- labeling & relabeling
- medical device testing
- online inventory & status visibility
- online order visibility
- order-to-cash packaging & repackaging of medical devices
- pick, pack, ship processes based on lot, serial, batch number or expiry date
- quality control recall management
- receiving
- recovery planning
- repair services
- returns management (quality check)
- reverse logistics
- sourcing & consolidation
- storage of ambient, cool & frozen
- surgical kits usage reporting
- tracking & tracing

Innovation in the medtech supply chain

Philips Healthcare

PHILIPS

- Royal Philips is a diversified technology company. The health care business makes up 42% of the global sales revenue.
- Products range from advanced molecular imaging systems, emergency care solutions, diagnostic ECG and X-ray to ultrasound products.
- More than 37,000 employees, working in 100 countries,
- Annual revenue € 9.6 billion
- After sales medtech 1 million orders, € 132 million international physical transport costs, 120,000 SKUs.

REQUIREMENTS

- After sales service for medical devices requires quick response to ensure uptime and patient safety
- Correct packaging is needed for cost efficiency in terms of damaged products (defoa's) (€ 8 million annually)
- Packaging policy is required for the accuracy of parts
- Lower transportation costs

SOLUTION

- Control Tower solution developed by Dutch FPC, part of Faes group
- Internet and visualization based control tool PackAssist including activity based costing for medical devices supply chain

FPC beyond packaging

Source: Philips Healthcare/ FPC

BENEFITS

- Quiet implementation of new suppliers, spare parts or policy
- Easy understanding for parts personnel by visualizations
- Worldwide communication regardless of language
- Reduction of defoa costs from € 8 million to a few € 100k
- Return on investment 1-2 months
- Reduction of transport costs up to 90% for certain parts

Medtech: case study

WL Gore

EMEA/APAC distribution centre

Creative Technologies Worldwide

CLIENT

- the Gore Medical Products Division provides creative healing solutions to complex medical problems. Gore provides such products as bio absorbable devices, synthetic vascular grafts, interventional devices, endovascular stent-grafts, unique materials for hernia repair, and sutures for use in vascular, cardiac, general surgery and orthopaedic procedures.
- approximately 9,500 associates in more than 30 countries around the world.
- annual worldwide sales of 3 billion US dollars

REQUIREMENTS

- warehousing and distribution to EMEA & APAC hospitals, clinics and research centres
- operation of the EMEA/APAC warehouse with more than 2.500 different items
- handling over 250.000 units & 40.000 RMA units per year
- FEFO, country specific tags, batch/lot control, multilingual shipping documents

SOLUTION

- product-specific shelve storage
- real time inventory management system
- product-specific packing for shipment
- multi handling checks to ensure high order accuracy
- line hauls to domestic carriers for hospital deliveries
- vanilla products in stock, postponed configuration

BENEFITS

- time critical distribution out of central hub in the Netherlands
- focus on core business
- minimised delivery/shipping/ specific handling times
- completely automated export and import avoiding any delays
- VAT deferment for EU sales (NL law)
- inventory accuracy of 99,99%

Source: Rhenus Contract Logistics

Medtech: challenges and competences

Your challenge	Competences in The Netherlands
We want to focus on core processes	• Mature and sophisticated logistics industry with logistic service providers specialized in medtech supply chains
We want to reduce cost and increase profitability	• Logistic service providers offer economy of scale, best practices and in-depth knowledge of medtech supply chains • Logistic service providers work on activity based costing principle providing you with a variable and flexible cost structure
We want to develop a flexible, responsive and agile supply chain	• Mature and sophisticated logistics industry with logistic service providers specialized in medtech supply chains • Strategic location, right in the middle of EU's main markets, European hub function • State of the art infrastructure: mainports and multimodal hinterland connections, connections to integrator hubs
We need full supply chain visibility	• Logistic service providers offer end-to-end supply chain visibility, mainports, customs etc. are connected
We have an increased need for value added services	• Logistic service offer a wide range of value added services related to the medtech supply chain • Fiscal system and customs facilitate tax effective value added services

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NDL/HIDC

Medtech: challenges and competences

Your challenge	Competences in The Netherlands
We want to improve order-to-cash	• Order-to-cash is part of the services provided by logistic service providers specialized in medtech
We face challenges with direct deliveries to hospitals	• Logistic service providers offer tailored medtech/hospital delivery solutions
We want to optimize information management	• The logistic sector is highly automated and connected
We want to optimize supply chain related cash flow	•Favorable indirect tax administration
We want to have a supply chain that is compliant with EU regulation	• Logistic service providers offer compliant European supply chain solutions • Logistic service providers offer compliance as a service
We need an ISO13485 certified logistic service provider	• The majority of logistic service providers specialized in medtech are ISO13485 certified
We need to get a better understanding of indirect taxes in the EU	• Logistic service providers offer tax effective European supply chain solution with focus on indirect taxes • Many service providers offer indirect tax related advice and services (consultancy, fiscal representation, etc.)
We need to get a better understanding of what processes we can outsource	• Logistic service providers in offer a wide range of services

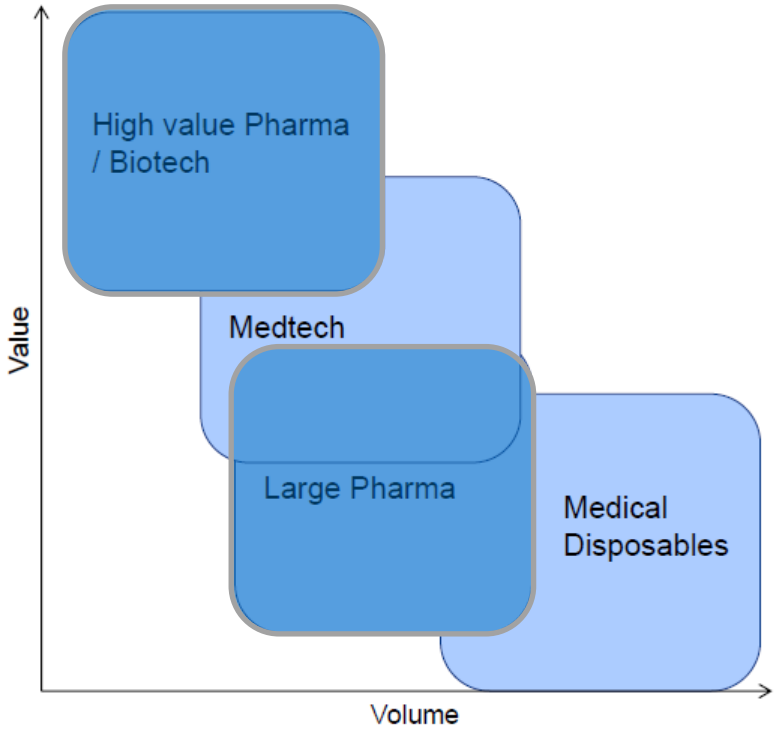
Medtech: challenges and competences

Your challenge	Competences in The Netherlands
We need to understand the optimal supply chain model for our company to cater to the European market	• Logistic service providers offer a broad range of optimized solutions to cater to the European market
We need to understand how we can use our supply chain as a differentiator	• There are many case studies of European supply chain operations in The Netherlands that are used as a differentiator available
How do we find the right partners	• HIDC provides advice on European supply chain structuring and offers matchmaking services

Pharma

Pharma: characteristics

Segmentation



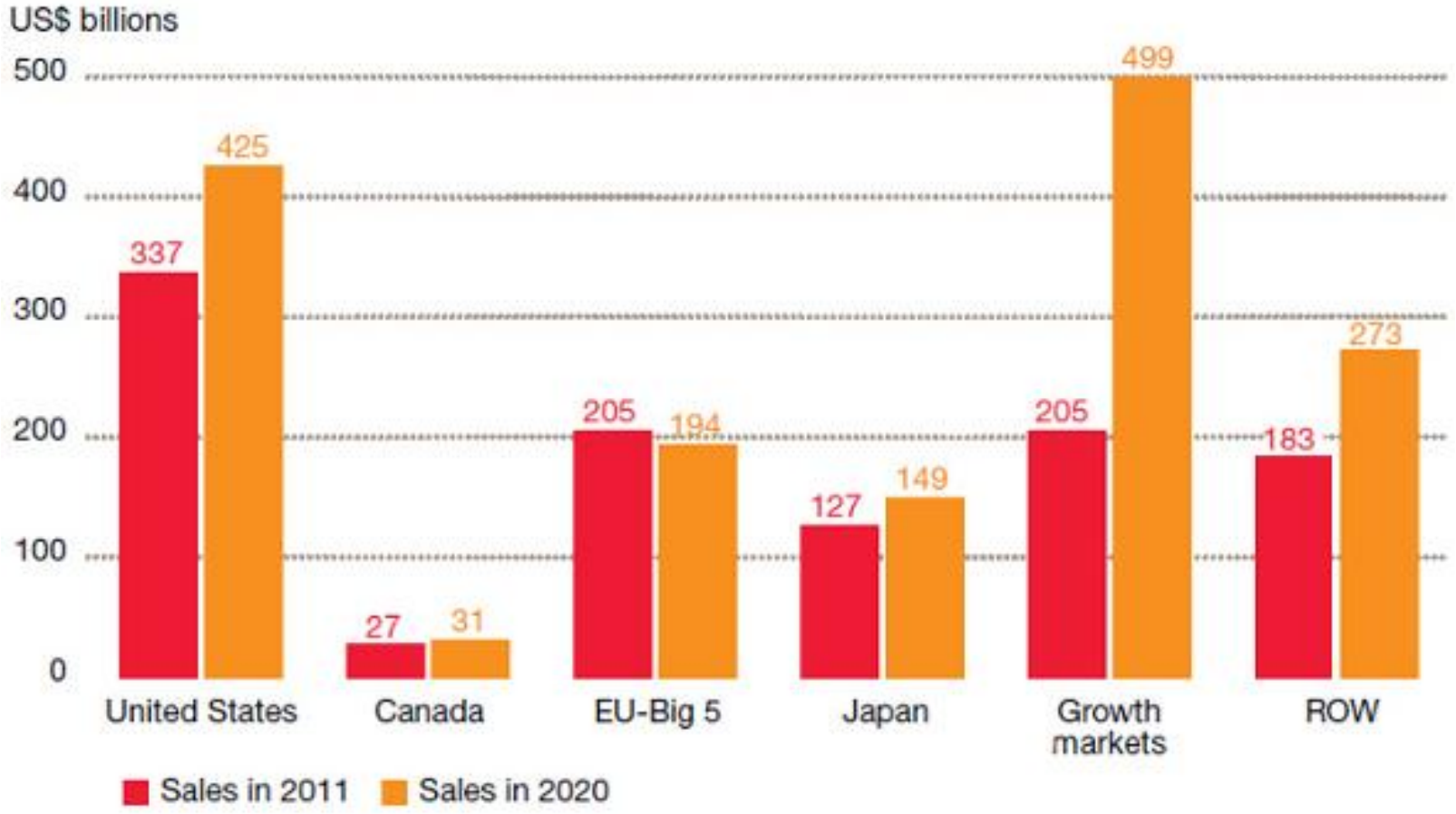
Supply chain characteristics

Elements	High value pharma / biotech	Large Pharma	Medtech	Medical Disposables
Value density	++ / +++	- / +	++ / +++	-
Volume	-	++	-	++ / +++
Order to delivery leadtime (EU)	Next-day	Next-day – 72 hours	Next-day (pre-x)	Next-day – 72 hours
Temp control importance	+++	++	+	0 / +
Distribution profile	Parcel	Pallet	Parcel	Pallet
Level of country-specific SKUs	+++	++	+++	+ / ++
Main commercial channel	Mix Direct/Indirect	Indirect	Direct	Mix Direct/Indirect

Source: Buck Consultants International

Pharma: facts & figures

The global pharmaceutical market could be worth nearly $1.6 trillion by 2020



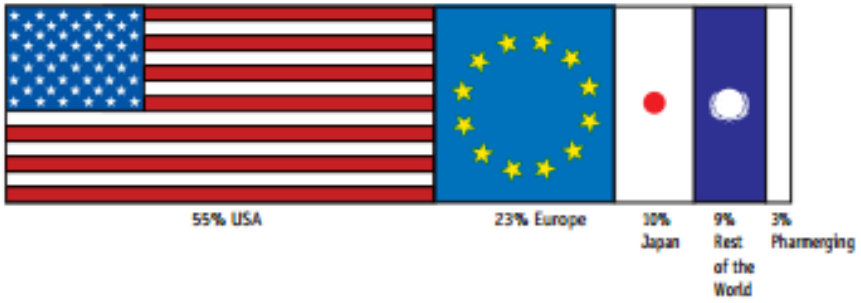
Source: PWC – Pharma 2020

Pharma: facts & figures

INDUSTRY (EFPIA total)	1990	2000	2012	2013
Production	63,010	125,301	213,003	217,500 (e)
Exports (1) (2)	23,180	90,935	312,377	316,500 (e)
Imports	16,113	68,841	224,811	226,500 (e)
Trade balance	7,067	22,094	87,566	90,000 (e)
R&D expenditure	7,766	17,849	30,035	30,630 (e)
Employment (units)	500,879	534,882	693,195	690,000 (e)
R&D employment (units)	76,126	88,397	115,196	115,000 (e)
Pharmaceutical market value at ex-factory prices	41,147	86,704	160,574	163,000 (e)
Pharmaceutical market value at retail prices	64,509	140,345	237,240	240,800 (e)
Payment for pharmaceuticals by statutory health insurance systems (3)	40,807	76,909	119,345	119,950 (e)

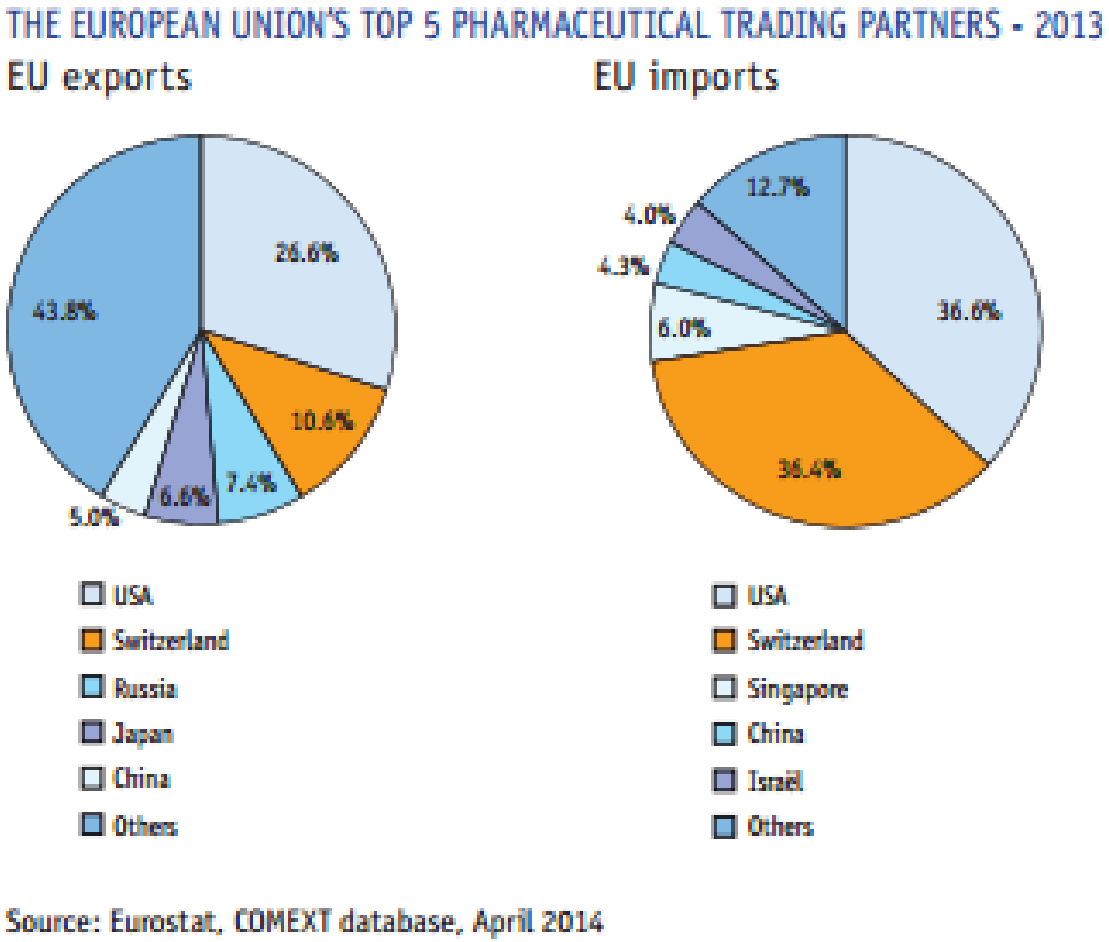
Values in € million unless otherwise stated
(1) Data relate to EU-27, Norway and Switzerland since 2005 (EU-15 before 2005); Croatia and Serbia included since 2010; Turkey included since 2011
(2) Data relating to total exports and total imports include EU-28 intra-trade (double counting in some cases)
(3) Since 1998 data relate to ambulatory care only

GEOGRAPHICAL BREAKDOWN (BY MAIN MARKETS) OF SALES OF NEW MEDICINES LAUNCHED DURING THE PERIOD 2009-2013



Source: The pharmaceutical industry in figures – key data 2014 - EFPIA

Pharma: facts & figures



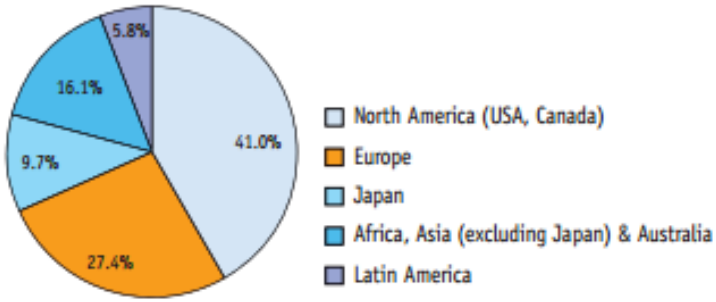
Source: The pharmaceutical industry in figures – key data 2014 - EFPIA

Pharma: facts & figures

PHARMACEUTICAL SALES

The world pharmaceutical market was worth an estimated € 655,222 million ($ 870,200 million) at ex-factory prices in 2013. The North American market (USA & Canada) remained the world's largest market with a 41.0% share, well ahead of Europe and Japan.

BREAKDOWN OF THE WORLD PHARMACEUTICAL MARKET – 2013 SALES

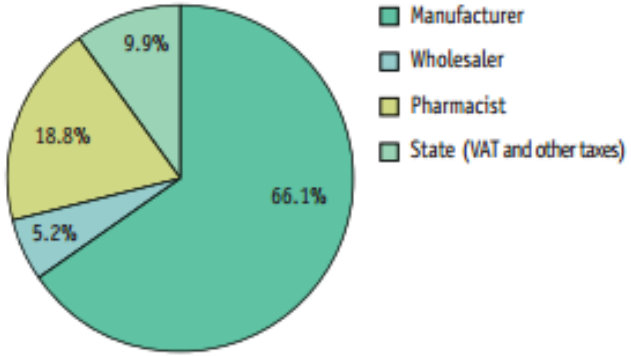


Note: Europe includes Turkey and Russia
Source: IMS Health (MIDAS), 2013 (data relate to the 2013 audited global retail pharmaceutical market at ex-factory prices)

PRICE STRUCTURE

Distribution margins, which are generally fixed by governments, and VAT rates differ significantly from country to country in Europe. On average, approximately 34% of the retail price of a medicine reverts not to the manufacturer, but rather to the distributors (pharmacists and wholesalers) and the State.

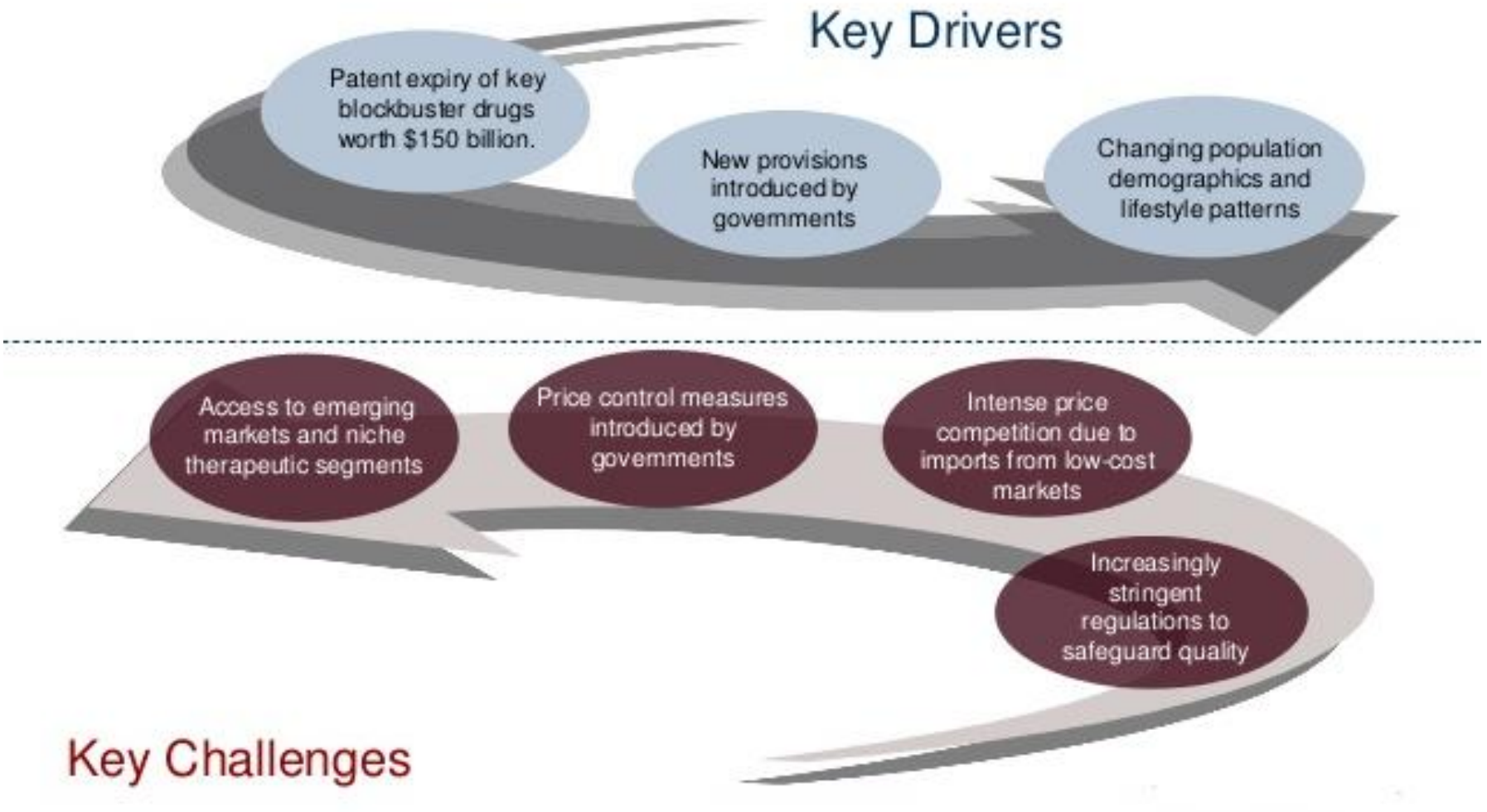
BREAKDOWN OF THE RETAIL PRICE OF A MEDICINE, 2012 (%)



Note: Non-weighted average for Europe (average estimate for 23 countries)
Source: EFPIA member associations

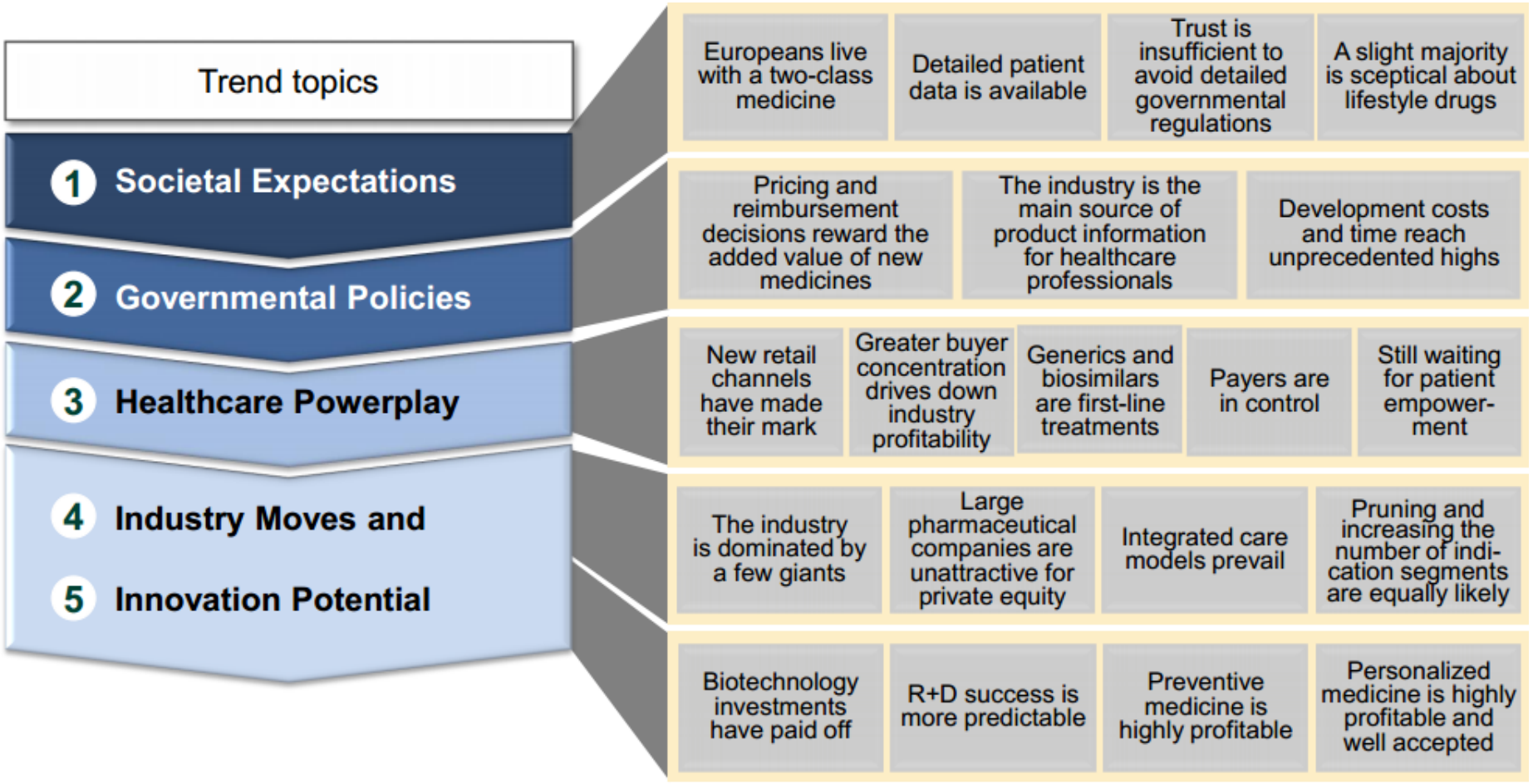
Source: The pharmaceutical industry in figures – key data 2014 - EFPIA

Pharma: key drivers & key challenges



Source: Frost & Sullivan

Pharma: trends & developments



Source: Fit for future? The pharmaceutical industry in Europe: trends and strategic options – Management Engineers - INSEAD

Pharma: trends & developments

Increasing supply chain complexity

PHARMA TRENDS	LOGISTICS IMPACT
• Direct to pharmacy distribution	• Differentiation to distribution channels
• Improved life cycle management	• Increase in product portfolio - # SKU's – late stage customization
• Profit margins are under pressure	• Globalization & standardization of logistics processes
• More stringent requirements enforced by GMP/GDP	• Temperature controlled logistics / RFID / Track & Trace
• Increase investments in R&D	• Control net working capital / inventory value

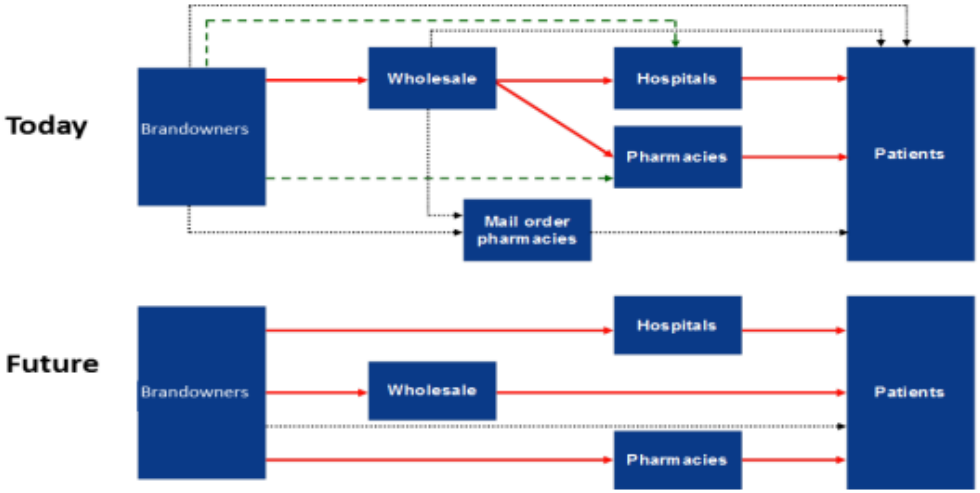
Source: Groenewout Consultants

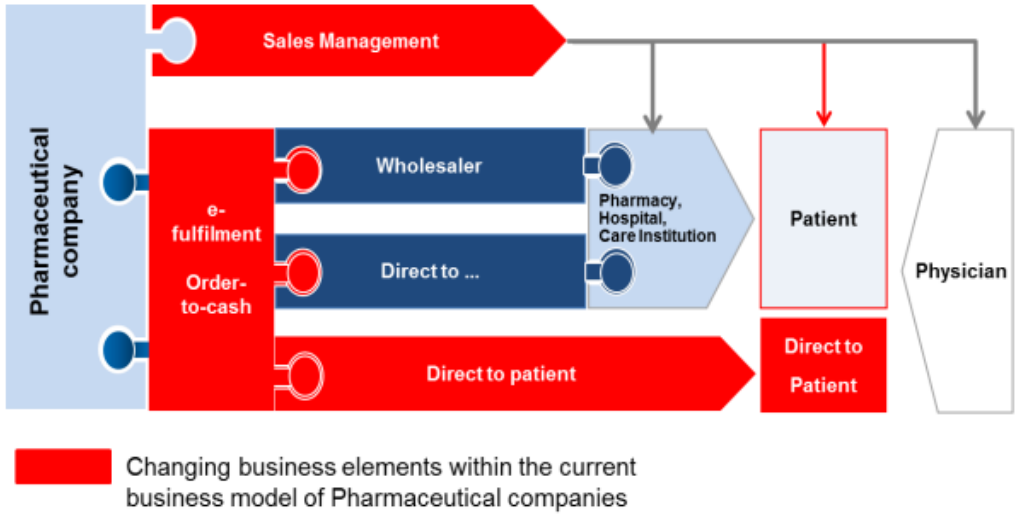
Pharma: key challenges

Key Challenges	Step change
1 Cost Pressures on the industry	From margin driven to cost driven
2 Changing Commercial Business Model	From indirect to direct marketing and sales
3 More Responsive Supply Chains	From "push" to "pull" driven
4 Information and Visibility	From black box to information highway
5 Final Mile Delivery Component	From one fits all to product/market/customer choice
6 Collaboration and Partnership	From single to collaborative supply chains
7 Leadership and Change Management	From fragmented to single chain of command
8 The role of e-commerce	From manual and indirect order2cash to online, automated and direct

Source: Buck Consultants International

Pharma: future model





Source: Buck Consultants International

Pharma: HIDC observations

- Focus on supply chain centralization, optimization and outsourcing
- Possibilities of centralization are limited by country specific regulations
- Many local-for-local supply chain operations in EU

Pharma: European regulatory system

- The **European Medicines Agency's (EMA)** main responsibility is the protection and promotion of public and animal health, through the evaluation and supervision of medicines for human and veterinary use.
- The Agency is responsible for the scientific evaluation of applications for European Union (EU)**marketing authorisations** for human and veterinary medicines in the centralised procedure.
- The EMA is responsible for coordinating the EU's **safety-monitoring or 'pharmacovigilance' system** for medicines.
- The EMA's committees are involved in **referral procedures** to resolve issues such as concerns over the safety or benefit-risk balance of a medicine or a class of medicines.
- The Agency is responsible for **coordinating inspections** requested by its committees in connection with the assessment of marketing-authorisation applications or referrals.
- The EMA is the hub of a **European medicines network** comprising:
  - over 40 national regulatory authorities;
  - the European Commission;
  - the European Parliament;
  - other decentralised EU agencies.

Source: European Medicines Agency

Pharma: European regulatory system

- The Agency is involved in the scientific evaluation of medicines that fall within the scope of the **centralised authorisation procedure**. However, thousands of other medicines that do not fall within this scope are marketed in the EU in individual EU Member States in accordance with **national authorisation procedures** not involving the EMA, or in several Member States through the decentralised or **mutual recognition procedures**.
- The mutual recognition and decentralised procedures are overseen by two coordination groups representing the EU Member States: the Coordination Group for Mutual Recognition and Decentralised Procedures - Human (CMDh) and the Coordination Group for Mutual Recognition and Decentralised Procedures - Veterinary (CMDv).
- The Agency can become involved in assessing nationally authorised medicines if they are referred to the EMA through a referral procedure. This may be due to a safety concern or an issue that requires resolution in the interest of protecting public health. Significant emerging safety issues concerning a medicine marketed in the EU can be referred to the Agency under the urgent Union procedure regardless of the medicine's initial authorisation route.

Source: European Medicines Agency

Pharma: Health Care Inspectorate (IGZ)

The Dutch **Health Care Inspectorate (IGZ)** promotes public health through effective enforcement of the quality of health services, prevention measures and medical products. It advises the responsible ministers and applies various measures, including advice, encouragement, pressure and coercion, to ensure that health care providers offer only 'responsible' care. The Inspectorate investigates and assesses in a conscientious, expert and impartial manner, independent of party politics and unaffected by the current care system.

Good Manufacturing Practice (GMP) is part and parcel of quality management. It ensures that products are always produced and inspected in accordance with the established quality norms for the intended application, as well as the terms and conditions of the marketing authorization. The principles of GMP have their basis in European legislation, namely Commission Directive 2003/94/EC ('Laying down the principles and guidelines of good manufacturing practice in respect of medicinal products for human use and investigational medicinal products for human use'). Proper storage and distribution is also part of quality management and ensures that quality is maintained at the level prescribed by the marketing authorization or product specifications throughout the distribution chain (Commission Directive 94/C 63/03).

Source: Health Care Inspectorate/Inspectie voor de Gezondeheidszorg

Pharma: GDP, GMP and GxP guidelines

Good distribution practice (GDP) deals with the guidelines for the proper distribution of medicinal products for human use. GDP is a quality warranty system, which includes requirements for purchase, receiving, storage and export of drugs intended for human consumption. GDP regulates the division and movement of pharmaceutical products from the premises of the manufacturer of medicinal products, or another central point, to the end user thereof, or to an intermediate point by means of various transport methods, via various storage and/or health establishments.

Good manufacturing practices (GMP) are the practices required in order to conform to guidelines recommended by agencies that control authorization and licensing for manufacture and sale of food, drug products, and active pharmaceutical products. These guidelines provide minimum requirements that a pharmaceutical or a food product manufacturer must meet to assure that the products are of high quality and do not pose any risk to the consumer or public. GMP, along with good laboratory practices and good clinical practices, are overseen by regulatory agencies in the United States, Canada, Europe, China, and other countries.

GxP is a general term for **Good (...) Practice** quality guidelines and regulations. These guidelines are used in many fields, including the pharmaceutical and food industries. The titles of these good practice guidelines usually begin with "**G**ood" and end in "**P**ractice", with the specific practice descriptor in between. GxP represents the abbreviations of these titles, where x (a common symbol for a variable) represents the specific descriptor.

Source: Wikipedia

Pharma: GDP certification

Maintaining product safety and quality during distribution is of utmost importance in the pharmaceutical industry. Good Distribution Practices (GDP) certification for pharmaceuticals demonstrates your dedication to GDP and quality in every aspect of your service.

GDP is a quality system for warehouse and distribution centers dedicated for medicines. Internationally accepted pharmaceutical GDP regulations stipulate that distributors of pharmaceutical products must align their operations with the standards. The scheme ensures that consistent quality management systems are in place throughout your entire supply chain, from the early delivery of raw materials to the manufacturing plants, to the final shipment of finished drugs to the end user. An independent assessment of compliance against international GDP requirements is the most effective way to establish that your quality management system aligns with GDP guidance.

Source: SGS

Pharma: GDP compliance

GDP compliant logistic service providers in HIDC network

Pharma: Center of Excellence for Independent Validators (CEIV)

To enhance air cargo security, the EU requires the "air cargo or mail carrier operating into the Union from a third country airport" to gain an ACC3 designation. As of 1st July 2014, an air carrier's designation only continues to be valid upon successful completion of an EU Aviation Security Validation performed by an Independent Validator accredited by an EU member state. Only validated carriers are authorized to fly cargo or mail into Europe.

IATA has been encouraged by its member airlines and European Regulators to support air carriers in complying with ACC3 EU Security Validation process. To respond to this demand, IATA Training and Development Institute created a pioneer Center of Excellence for Independent Validators (CEIV) to train, advise and support industry stakeholders.

IATA created a CEIV in pharmaceutical logistics with the aim of helping the industry to improve the transport and handling of pharmaceutical products to meet the requirements of shippers and manufacturers.

Source: IATA/Schiphol Cargo

Pharma: indirect taxes

Import duties

- EU import duties on pharma are frequently 0%
- Actual percentages depend on tariff code and origin

VAT

- Import VAT on pharma in The Netherlands can be 6% or 21% depending on the classification of the product
- Other EU countries can have different import VAT percentages than The Netherlands
- It is possible to have a neutral cash flow in relation to import VAT administration in The Netherlands
- VAT on intra-community (EU) transactions differs per type of transaction (business-to-business, business-to-hospital, business-to-patient/consumer) and Inco-term

HIDC highly recommends to make use of specialized advisors in order to structure a tax effective supply chain.

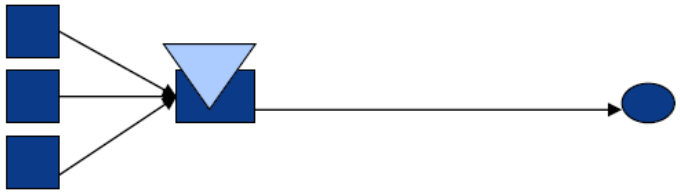
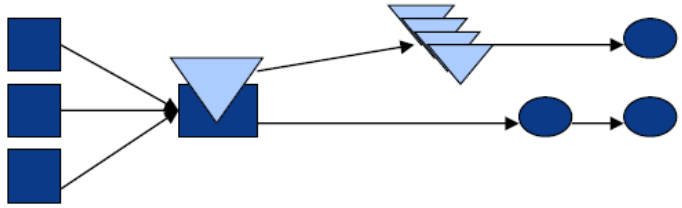
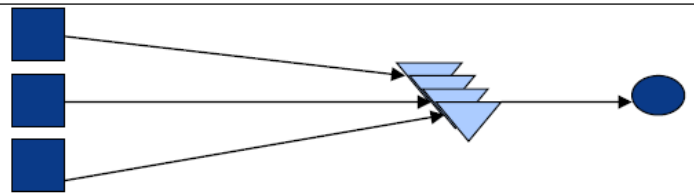
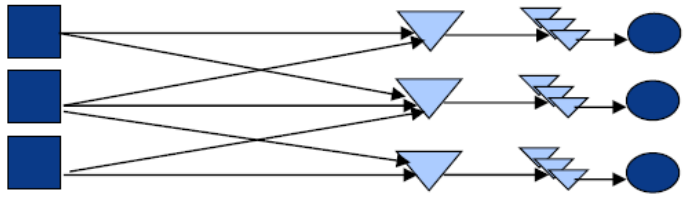
Pharma: supply chain

Pharma: supply chain

Centralization of Supply Chain Control	• Strengthening of SC Organizations • Investments in SC Talent • Corporate SC taking ownership of the downstream supply chain
Network Consolidation	• Consolidation of Distribution Networks • Mix of full centralization, regionalization and hub-spoke models • Scope: downstream, still lack of full chain scope
Visibility	• Control Tower / Transport Management concepts • Linking inbound, intercompany and secondary distribution • Information is Key
Outsourcing & Partner Portfolio Reduction	• 3PL landscape in pharma has improved highly • Towards LLP/4PL models • Strong reduction of number of partners used • Towards harmonized (global) contracts
Customer Service / Order to Cash process harmonization	• CS and O2C activities closely linked to physical supply chains • Harmonization & centralization of CS and O2C organizations
Supply Chain Differentiation	• From one size fits all to differentiated supply chains per product/market combination • SC becoming a stronger counterpart for the commercial team, challenging service requirements
Supply Chain Collaboration	• Logistics not a key differentiator, therefore the industry is recognizing the opportunities of collaboration • How to break through from pilots to full realization?

Source: Buck Consultants International

Pharma: supply chain

Centralized		• Fully centralized • **High value / low volume products** • Often parcel type of distribution
Central + Sats		• Main inventory in central warehouse • Local sats replenished by EDC • Sometimes combined with postponement • Strategic stocks in country DCs • **Medium - High value products**
Regionalized		• Regional DCs (4-6) supplying a fixed region • Logical clusters of countries • **"Big Pharma" portfolios**
Hub spoke per region		• Regional DCs (4-6) supplying a fixed region • Logical clusters of countries • **Differentiated portfolios**

Source: Buck Consultants International

Pharma: supply chain services

Logistics, fulfilment, distribution, value added, financial and customer services include:

- 4PL
- assembling of kits
- country specific labeling and packaging
- customer service
- delivery to sales reps or GP
- designing of label layouts
- direct-to-patient distribution
- direct-to-pharmacy distribution
- financial services/order-to-cash
- import/export handling
- inventory management
- kitting of displays
- labeling
- legal & regulatory restrictions: manufacturer licence
- order processing
- postponement
- printing
- product release
- quality control
- quantity monitoring
- recall management
- relabeling and repackaging
- reporting
- returns management
- secured storage
- separated from goods for sale
- storage (ambient, controlled, cold)
- temperature controlled transportation

Pharma: testimonial

Location: **Breda**
Activities: European distribution
Industry: pharma
Employees: 2,500 (total in NL)
Country of origin: USA

Abbott Warehousing & Distribution in Breda is the logistical heart of a global pharmaceutical company that is famed for its life-saving and life-extending drugs. The US company certainly lives by its motto, 'A Promise for Life', and in Breda Abbott is making that promise come true by demanding the highest quality of both its drugs and its logistical operations.

Abbott, which was founded in 1888 and is headquartered in Chicago, has branches in over 100 nations and more then 80,000 employees around the world. The company has had a presence in the Netherlands for over half a century and, thanks in part to a number of acquisitions, it has today a workforce of around 2,500 around the country. Since 2006, Breda has served as its logistical center, working closely together with the corporation's Zwolle branch where finance, planning, customer services and other support services are located. "Abbott Warehousing & Distribution in Breda takes on a pivotal role in distributing our drugs, medical nutrition products and veterinary drugs to over 160 nations," says Jolanda Cortlever, general manager for both the Zwolle and Breda branches of Abbott. "We move our products through distribution centers and Abbott branches in Brazil, Russia, India, China, South Africa and numerous others. Furthermore, we are also increasingly supplying end-users in Western and Eastern Europe from Breda."

Transport as another specialty

The Abbott logistical center in Breda is the most high-tech center of its kind and was constructed to resemble a silo where robotic forklifts shift some 30,000 pallets on 30-meter high scaffolding. "We have almost fully automated our logistics process," explains Cortlever. "This allows us to guarantee that our service is of a consistently high quality."

Aside from storage and distribution, Abbott's Breda activities also include value added logistics such as finishing, labeling and postponement. "And our logistical stake in Abbott's worldwide activities does not stop once the drugs are en route," the general manager says. We monitor the transport until the products have safely reached their final destination. The activities in our branch are undertaken with the greatest care, a fact that all our staff are well aware of. And we impose the same requirements on transportation, selecting the modality that suits the product, objective and destination the best. The transportation environment must be the absolute best possible, as many drugs are temperature-sensitive – a factor which is always the case when it comes to biological medicines. It is clear that transport has become an additional specialty for Abbott in Breda."

Abbott's ambitions find a home in Breda

When it comes to establishing satellites, Breda fits in perfectly with Abbott's ambition of providing maximum performance for all its customers. "Breda is close to the international Ports of Rotterdam and Antwerp as well as the airports in Amsterdam, Frankfurt and Paris," says Cortlever. "We also have access to well-trained, multilingual staff who can work very well in English. Moreover, the Netherlands is a country where people with many different cultural backgrounds work well together. Out of the workforce here at Abbott in Breda, I've counted over 20 different nationalities. The country is politically stable, while the financial climate and the tax regime and customs facilities are all to our benefit. And finally, we have an excellent level of contact with organizations such as the municipality and BOM Foreign Investments."

Source: BOM Foreign Investments/NFIA

yourlogisticsgateway.nl
NDL/HIDC

Pharma: challenges and competences

Your challenge	Competences in The Netherlands
We want to focus on core processes	• Mature and sophisticated logistics industry with logistic service providers specialized in pharma supply chains
We want to reduce cost and increase profitability	• Logistic service providers offer economy of scale, best practices and in-depth knowledge of pharma supply chains • Logistic service providers work on activity based costing principle providing you with a variable and flexible cost structure
We want to develop a flexible, responsive and agile supply chain	• Mature and sophisticated logistics industry with logistic service providers specialized in pharma supply chains • Strategic location, right in the middle of EU's main markets, European hub function • State of the art infrastructure: mainports and multimodal hinterland connections, connections to integrator hubs
We need full supply chain visibility	• Logistic service providers offer end-to-end supply chain visibility, mainports, customs etc. are connected
We have an increased need for value added services	• Logistic service offer a wide range of value added services related to the pharma supply chain • Fiscal system and customs facilitate tax effective value added services

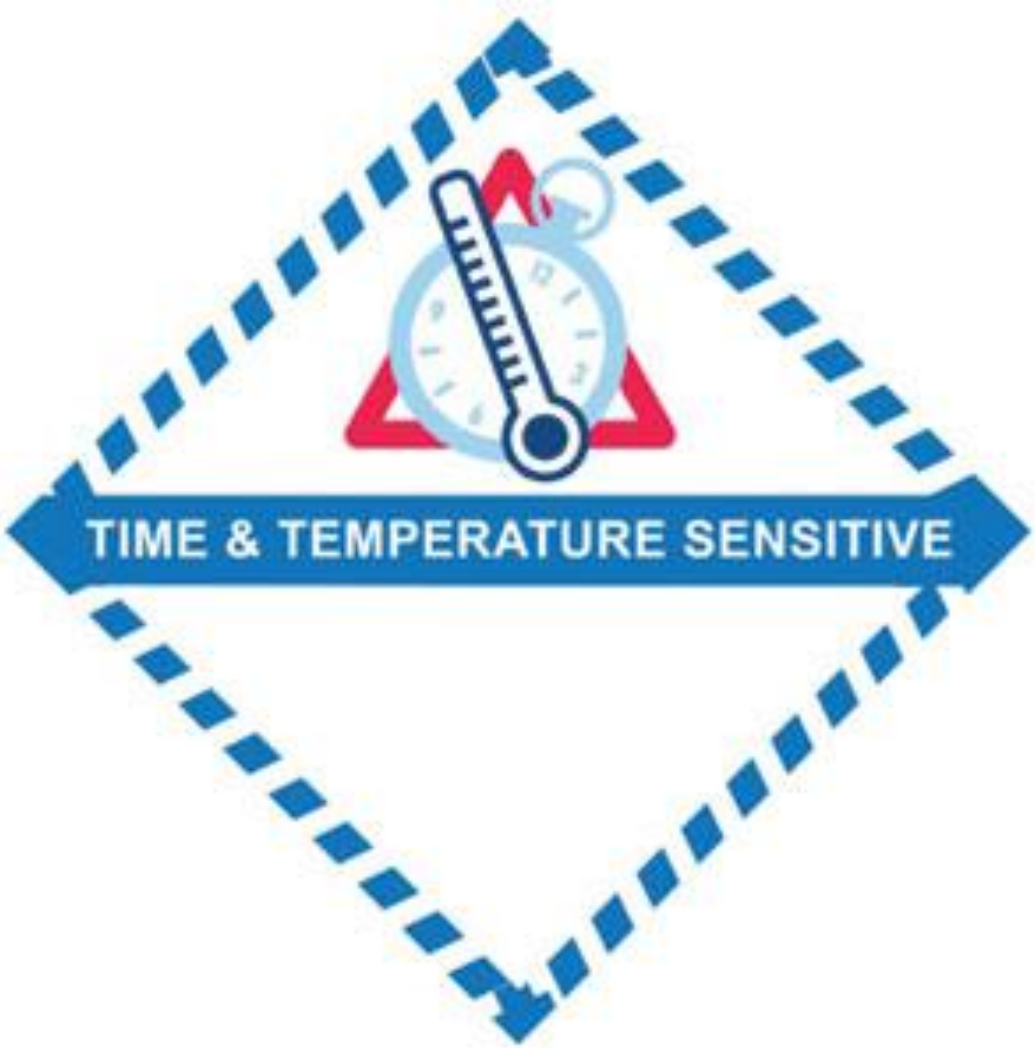
Pharma: challenges and competences

Your challenge	Competences in The Netherlands
We want to improve order-to-cash	• Order-to-cash is part of the services provided by logistic service providers specialized in pharma
We face challenges with direct-to-patient, -hospital and -pharmacy distribution	• Logistic service providers offer tailored direct-to-patient, -hospital and -pharmacy distribution solutions
We want to optimize information management	• The logistic sector is highly automated and connected
We want to optimize supply chain related cash flow	• Favorable indirect tax administration
We want to have a supply chain that is compliant with EU regulation	• Logistic service providers offer compliant European supply chain solutions • Logistic service providers offer compliance as a service
We need a GxP compliant logistic service provider	• The majority of logistic service providers specialized in pharma are GxP compliant
We need to get a better understanding of indirect taxes in the EU	• Logistic service providers offer tax effective European supply chain solution with focus on indirect taxes • Many service providers offer indirect tax related advice and services (consultancy, fiscal representation, etc.)
We need to get a better understanding of what processes we can outsource	• Logistic service providers in offer a wide range of services

Pharma: challenges and competences

Your challenge	Competences in The Netherlands
We need to understand the optimal supply chain model for our company to cater to the European market	• Logistic service providers offer a broad range of optimized solutions to cater to the European market
We need to understand how we can use our supply chain as a differentiator	• There are many case studies of European supply chain operations in The Netherlands that are used as a differentiator available
How do we find the right partners	• HIDC provides advice on European supply chain structuring and offers matchmaking services

Cold chain



Cold chain definition

A **cold chain** is a temperature-controlled supply chain. An unbroken cold chain is an uninterrupted series of storage and distribution activities which maintain a given temperature range. It is used to help extend and ensure the shelf life of products such as fresh agricultural produce, seafood, frozen food, photographic film, chemicals and pharmaceuticals. Such products, during transport and when in transient storage, are called cool cargo. Unlike other goods or merchandise, cold chain goods are perishable and always en route towards end use or destination, even when held temporarily in cold stores and hence commonly referred to as cargo during its entire logistics cycle.

Source: Wikipedia

Passive and active cold chain

There are two major ways to move temperature controlled products or payloads, passive provision or active provision of temperature control.

Active systems are what you typically think of as temperature control; freezers, fridges and cold rooms. When it comes to shipments, these active systems are typically just mounted on trailers, vans or pallets. They provide thermal control which actively responds to the adverse temperatures outside.

Passive systems are less obvious and most people would know them from coolers or chilly bins, combining ice or cool-packs with insulation to provide a fixed amount of thermal protection. Its ability to protect a payload depends upon the design and preparation of the passive system.

The choice between actives and passives involves a large number of factors including:

- Cost
- Level of protection required
- Need for power supply
- Availability for use
- Flexibility of your supply chain
- Extremities of external environment

When powered and handled correctly, active systems can provide a high level of thermal protection, advanced units being capable of both heating and cooling in response to low or high external temperatures. They typically consume fuel, use battery power, or require constant external power to operate. This imposes tight restrictions on handling and shipping. The scale of these systems is typically from single pallet to whole vehicles. For high utilization of space on fixed shipping routes and with good handling agreements, active solutions provide a good level of protection. There are inefficiencies however when only small payloads need to be moved. The high initial costs for the units also pose a barrier to use. To ameliorate the inefficiency, suppliers often lease units to reduce the costs to the single customers while increasing the utilization of the units.

The passive systems in contrast can be scaled from single vials to multi-pallet and once assembled for shipping can be sealed and sent without the need for power supply and typically without temperature aware handling. They can travel through a wide range of carriers and integrators. The thermal performance occurs irrespective of the handling or external environment so re-routing and flexible supply chains can be accommodated. The performance is determined by initial design and preparation, in contrast to active solutions, the duration of the thermal protection is finite. They are comparatively low unit cost and so can be held in stock to allow flexibility of supply. Not requiring special handling and being size versatile, if there are a large number of destinations for payloads, in differing quantities, the passive solutions can provide a very economic solution.

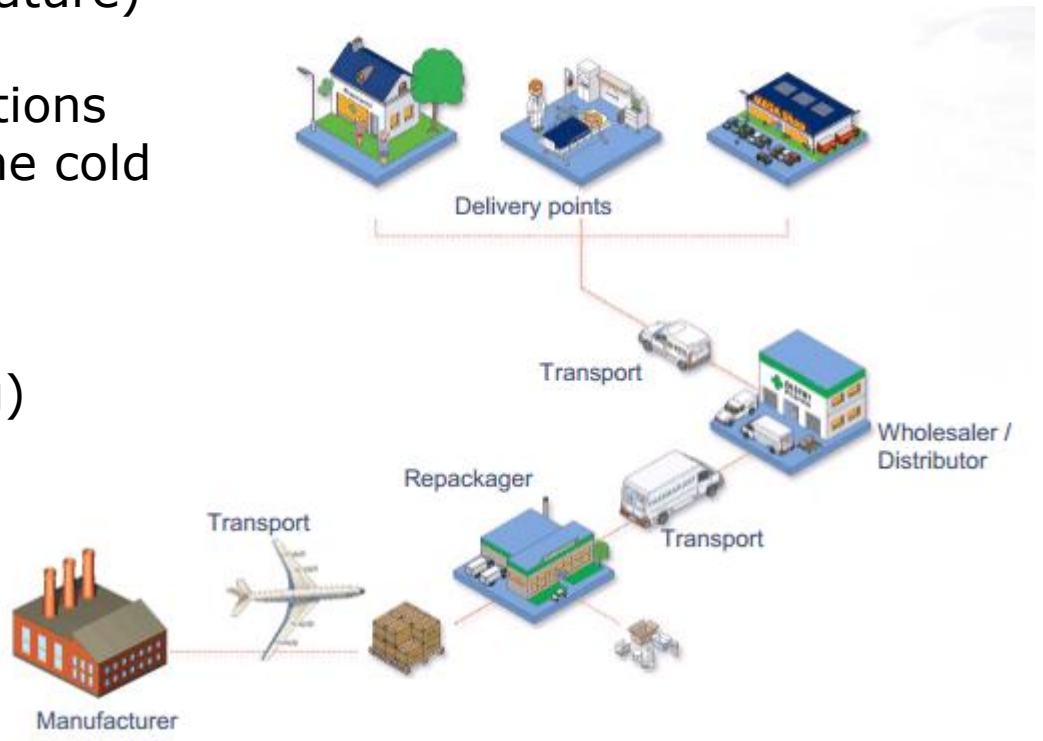
The choice between the active and passive solution, given an acceptable quality level, is best approached on a total cost of ownership model where the flexibility of provision, the security of supply to the market, the replacement and quality costs along with the shipping costs and thermal solution costs are all evaluated.

Source: Intelsius

Cold chain challenges

Challenges in the cold chain:

- preserve the adequate storage & handling conditions (temperature) throughout the cold chain
- document the storage conditions (temperature) throughout the cold chain
- maintain the product safety throughout the supply chain (temperature, counterfeiting)



Innovation in the pharma cold chain

Panalpina

- Global logistics company in air and ocean freight
- Approximately 16,000 employees in 500 offices in over 70 countries with global coverage
- 11+ Healthcare Centers of Excellence compliant with Good Distribution Practice (GDP) standards and 43 certified Envirotainer (QEP) stations for cool chain handling
- Net forwarding revenue 6,758 CHF

REQUIREMENTS

- Quality control of cold chain conditions for temperature-sensitive pharma shipments
- Real-time monitoring
- Possibility for real-time supply chain control and interference
- Transparency and visibility
- Modality independent

SOLUTION

- Smartview, developed by Dutch software company Antaris Solutions
- Web platform for cold chain optimization
- Wireless sensors for different shipments and transport modalities

antaris
member of the berlinger group

BENEFITS

- End-to-end visibility
- Pro-active temperature monitoring & control
- Real-time shipment management
- Remote facility monitoring
- Real-time vehicle tracking
- Alerting by email and text messages
- Advanced reporting & analytics
- New business development

E-health

E-health: definition

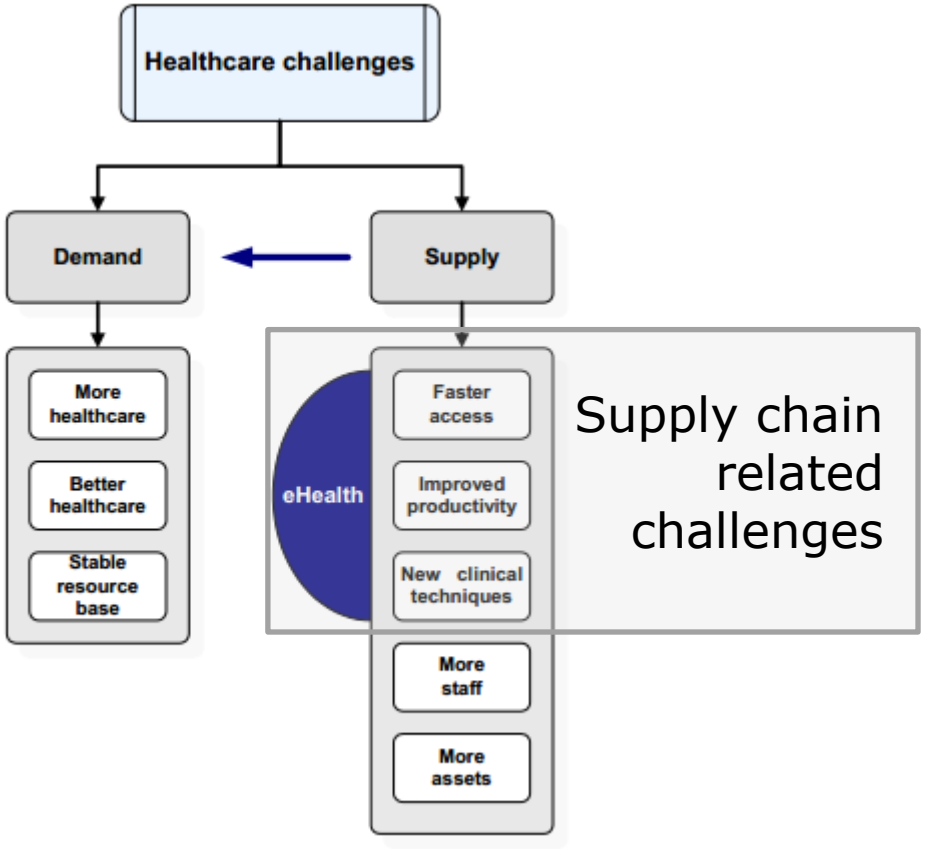
E-health is the transfer of health resources and health care by electronic means. It encompasses three main areas:

- The delivery of health information, for health professionals and health consumers, through the Internet and telecommunications.
- Using the power of IT and e-commerce to improve public health services, e.g. through the education and training of health workers.
- The use of e-commerce and e-business practices in health systems management.

E-health provides a new method for using health resources - such as information, money, and medicines - and in time should help to improve efficient use of these resources. The Internet also provides a new medium for information dissemination, and for interaction and collaboration among institutions, health professionals, health providers and the public.

Source: WHO

E-health: supply chain impact



Source: The economic impact of e-health – eHealth IMPACT