Monitoring and improving the Dutch life sciences & health cluster
Main conclusions Dutch Life Sciences Outlook 2012:

- **GROWTH AND OUTPERFORMANCE**
  The Dutch life sciences cluster shows growth in size and products and outperforms the Dutch economy on growth in number of companies and employment

- **POSITIVE EXPECTATIONS**
  Entrepreneurs have positive expectations of the future despite disappearance of large companies

- **PARTNERING**
  Facilitating (international) partnerships remains very important for future growth of the companies in the Dutch life sciences cluster
Content of the Dutch Life Sciences Outlook 2012

Since 2009, a yearly systematic Outlook is presented on the performance and progress of the Dutch life sciences & health (lsh) cluster.

The Outlook 2012 has been compiled with the utmost care based upon available data in 2011. The authors are well aware of the fact that the data position on the Dutch lsh cluster needs to be improved by the cluster to allow for adequate monitoring of the effects of proposed strategic policy actions. Readers are advised to contact the authors of the report to avoid potential misinterpretations of the reported results. Authors welcome suggestions for improvement for the Outlook 2012 (please contact info@thedecisiongroup.nl).

see also www.lifesciencesoutlook.com
**Contribution of the Dutch Life Sciences Outlook**

A proven methodology and reliable dataset is provided to measure the progress on realizing the ambition set in the life sciences & health top sector plan.

- **SINCE 2009** three editions have been published with a methodology validated by industry and international top academics

- **MOST RECENT** available data is used in each Outlook. In this 2012 Outlook edition data is used from 2010 with preliminary data on 2011

- **SUSTAINABLE DEFINITION** that captures the convergence of red biotech, pharma and medical technology

- **COMPARISON** possible over years based on clear definition and reliable data from yearly updated firm by firm database

- **DIRECT DATA** collected and analyzed at the level of individual companies or investments (indicated by 🍀)
The Outlook 2012 Edition

Forecast and expectations of the Dutch Lsh cluster are included in the Outlook 2012 edition.

Outlook 2012 Edition: Forecast & Survey

The focus of the 2012 edition is on:

- **Forecasts** of the Dutch Lsh cluster.
- **Trends** in 3-years of primary data
- **Expectations of the cluster** in the Dutch Life Sciences & Health Cluster Survey.

Outlook 2011 edition: Data position

Improved the data position with more up to date and primary data.

Outlook 2010 edition: Proof of Concept

Provided a proof of concept with academic grounding and involvement of entrepreneurs.

see also www.lifesciencesoutlook.com
Definition in the Dutch life sciences & health cluster

Given the convergence of industries, the developed definition has proven to be sustainable and is in line with the top sectors.

Scope of outlook

- Agrofood
  - Food
    - Nutraceuticals
    - Life sciences & health
    - Biomaterials
    - Energy
    - Pharma
    - Medical technology (incl. imaging)
    - Regenerative medicine
    - High tech systems/ICT

- Horticulture & propagation materials
- Agriculture
- Technology
- Chemical
- Creative industry
- Healthcare
- Chemicals and energy
- Energy

-Scope of the Outlook 2012 is similar to the scope of the Outlook 2011-

see also www.lifesciencesoutlook.com
Focus of the Dutch Life Sciences Outlook 2012

A valuable tool to identify the sector composition and to define the innovative core of the entire Dutch Lsh cluster is provided with the cluster map.

The performance of the cluster is measured on employment, number of companies, revenue, products in development, public investments and private investments raised within the core value chain.

Suppliers
- Bioelectronics, Bioinformatics
- Analysis Software
- Medical Equipment
- Laboratory Equipment
- Ophthalmic Goods
- Diagnostic Substances
- Containers and Packaging
- Chemical products

Value Chain
- Care and Cure providers
  - Teaching and Specialized Hospitals
- Distribution
- Marketing & Sales
- Manufacturing
  - R&D companies
    - Drugs and Medical Device companies
    - (Pharma, Biotech, Medical Engineering)
- Specialized Research service providers
  - Contract Manufacturing Organizations, Contract Research Organizations, Clinical studies, Synthesis services
- Specialized Research suppliers

Service Providers
- Cluster Organizations
  - Niaba, Nefarma, Biofarmind, LSH
- Regulation
  - CCMO, METCs, FDA, EMA
- Reimbursement
  - Healthcare Insurance Companies, VWS dep of GMT
- Specialized Business Services
  - Banking, Accounting, Legal
- Specialized Risk Capital
  - VC Firms, Angel Networks
- Health Insurance
  - Laboratory, Clinical Testing

Cluster Organizations
Niaba, Nefarma, Biofarmind, LSH

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1 referred to in topsector plan as innovative core

The cluster map is in the process of international recognition

The performance of the cluster is measured on employment, number of companies, revenue, products in development, public investments and private investments raised within the core value chain.
A firm by firm recheck of the entire updated database was done for The Dutch Life Sciences Outlook 2012. Additional internal and external validity checks were performed.

Additional internal and external validity checks performed:
- Databases
- New checks on public investments
- 25+ sources
- Annual reports checked for revenue
- Recheck KvK (chamber of commerce) update
- Patent database check

Data on the activities in The Netherlands of each company within the value chain

Data on number of products from Thomson Pharma, ClinicalTrials.gov, Medtrack, survey and company websites

see also www.lifesciencesoutlook.com
Key outcomes Dutch Life Sciences Outlook 2012

Executive Summary
Context of the Dutch Life Sciences Outlook 2012

Improving the health of the ageing population in difficult economic times is one of the biggest challenges to which the Dutch life science cluster can contribute.

Health

Wealth

| Eurocrisis |

| Budget reductions |

€18 billion package of budget reductions by Dutch government
**Contribution of the Dutch life sciences & health cluster**

**The Dutch life sciences cluster produces new products that may contribute to reducing costs and at the same time improving health.**

- Improving effectiveness and efficiency of diagnostics -

  Each year over eight million people die of cancer worldwide. Patients' chances of survival vary widely: depending on the type of cancer involved, the stage at which it is diagnosed and the speed with which appropriate treatment is launched.

  **Source:** http://www.skyline-diagnostics.nl

- Improving effectiveness of treatment -

  Each year, approximately 400,000 patients across the world are affected by brain cancer. Treatment options for this devastating disease are limited and overall prognoses are poor. The neuroprotective blood-brain barrier is limiting the delivery of many anti-cancer drugs to tumors in the brain.

  **Source:** http://www.tobbb.com

The next Dutch Life Sciences Outlook aims to develop an additional focus to include more data on the impact of new product on the costs of healthcare. Initiatives to explore this new part of the health outlook have been started, in close collaboration with the International Academic Advisory Council.

Examples mentioned with illustrative purposes and can not be seen as a complete overview.

The Dutch lsh cluster grows in size and products. The cluster is stimulated by increased public investments in 2010.

Summary of cluster performance (2009-2010)

SIZE

- Number of companies: 329 (+5%)
- Employment: 24,385 jobs (+0.5%)

OUTPUT

- Revenue: 17.7 b€ (-5%)
- Number of products: 111 (+7%)

INPUT

- Public investment: 297 m€ (+19%)
- Private investment raised: 280 m€ (-55%)

Note: 2010 data is the most recent available at the moment of publication (Jan 2012) for all indicators.
Dutch Performance in International context

Above average performance for Revenue and Public investments is demonstrated by the Dutch Ish cluster compared to international key clusters.

The Dutch Ish cluster\(^1\) compared to international key life sciences & health clusters scores:

- Above average on revenue (17.7 b€ in 2010), primarily due to the revenue of MSD (Organon) and Philips Healthcare.
- Slightly above average for public investments (297 m€ in 2010) due to the innovation credit.
- Below average on private investments raised (280 m€ in 2010) due to some very large deals in the Munich and Boston areas as well as in Switzerland.

The Boston area remains at top position, as in 2009, and scores highest on 4 out of 6 performance indicators.

\(^1\) A more detailed account of this data is given in Chapter 3.
Dutch Progress in international context

Above average progress on the number of companies and public investments is made by the Dutch Ish cluster when compared to international key clusters.

The progress of the Dutch Ish cluster compared to international key life sciences & health clusters scores:

- Above average on:
  - Number of companies (5% increase from 314 in 2009 to 329 in 2010).  
  - Public investments (19% increase from 258m€ in 2009 to 297m€ in 2010).  

- Slightly below average for employment compared to the key Ish clusters.

- Below average for 3 out of 6 performance indicators of the international key Ish clusters:
  - Private investments are volatile by nature. 2009 was an exceptionally successful year, resulting in a relatively reduced private investment raised in 2010.
  - Revenue slightly decreased.
  - Number of products in development increased but three clusters had exceptional growth in number of products.

A more detailed account of this data is given in Chapter 3.

For Private investments raised and number of products the scale is adjusted to make a practical comparison possible.
The Dutch lsh cluster has outperformed the Dutch economy on growth in Number of companies and Employment during 2008-2010.

The Dutch lsh cluster has shown higher growth in the Number of companies than the Dutch economy.

Source employment growth the Netherlands: CBS statline 2011 and The Decision Group database

The Dutch lsh cluster has shown a higher growth in Employment than the Dutch economy.

Source company growth in the Netherlands: CBS statline 2011 and The Decision Group database
Steady growth in size is shown by the Dutch lsh cluster, however for 2011 a reduction in employment is estimated due to restructuring of Abbott’s and MSD’s operations in The Netherlands.

Based on preliminary data*, growth in Number of companies is expected to continue in 2011.

Based on preliminary data*, employment is expected to decline due to restructuring of Abbott’s and MSD’s operations in the Netherlands.

*Preliminary data 2011 (October 2011) is based on input of clusters, science parks, TTOs in the Netherlands and press releases. 2011 data will be cross checked and updated with Chamber of Commerce data when available. MSD management expects the restructuring of operations in NL to have less impact on employment.
The Dutch Ish cluster expects to cope with the disappearance of cornerstone companies but foresees a negative effect on cluster performance due to diminishing Public investments.

**Business knowledge**

R&D of large pharma companies is expected to be placed outside the Netherlands. However, 60% of replies include positive effects. Most respondents anticipate growth in startups in the cluster. The cluster thinks it more likely that experience and knowledge result in startups and spinoffs than in a ‘brain drain’

- See page 62 for more background -

**Cluster building**

Cluster size and output for 2015 are expected to be positive. Respondents forecast growth similar to key international clusters. However, Public investments are expected to decrease.

- See page 52 for more background -

**Public investment**

The Dutch government cuts down public funding in innovation for life sciences. Almost 80% of respondents regard this as problematic for diverse reasons, mainly because innovation is constrained and startups face difficulty in growth.

- See page 59 for more background -

**Investment climate**

Independence over the next five years is expected by the majority of respondents, two thirds of them in a strategic partnership or alliance with another company. 17% of companies in the core value chain expect a takeover.

- See page 55 for more background -

Results of the 2011 Dutch Life Sciences & Health Survey and further background can be found in Chapter 6.

see also www.lifesciencesoutlook.com
Continued growth in Number of companies is expected in the Dutch life sciences cluster.

The cluster has demonstrated a stable growth in Number of companies over the last 7 years.


The cluster mostly expects an increase in number of companies as a positive effect of the disappearance of large companies.

What effect do you expect of the disappearing of large companies in the cluster?

- Positive effect: 58%
- Negative effect: 2%
- No effect: 30%

What positive effect do you expect?

- Number of companies will grow: 59%
- Increased opportunities for SMEs (less competition on funding, more room): 15%
- Innovation will be stimulated: 16%
- Other positive effect (e.g. unification): 12%

Analysis based on 43 respondents, 18 in the core value chain.
Innovation and small and medium companies are expected to be under pressure due to reduction in Public investments.

Public investments are expected to decrease after a temporary increase in 2010.

The cluster expects innovation, research, product development and start ups will be most affected by the reduction of Public investments.

Analysis based on 43 respondents, 18 in the core value chain.
Forecast insights on today’s topics (3/3) – Partnering

Facilitating companies in their (international) partnering is expected to remain very important for future growth of the companies in the Dutch Life cluster.

Signing strategic alliances is very volatile by nature, resulting in large variances over the years.

The cluster expects partnerships or alliances to be a major source to finance future growth.

Analysis based on 43 respondents, 18 in the core value chain.

*Source: press releases individual companies, NvP report April 2011; moment of measurement October 2011
Dutch life sciences & health cluster success

Measuring performance and progress
The Dutch Ish cluster is growing steadily mainly due to an increase in small startup companies.

The Number of companies increased with 5% from 314 (2009) to 329 (2010).

- Source: The Decision Group database -
**Performance indicator #1: Number of companies**

Although being the smallest cluster compared with the best international key clusters, the progress (growth%) of the Dutch Ish cluster is above average.

The Number of companies of the Dutch Ish cluster is lower than the selected key clusters. However progress (growth %) is above average*.

![Bar chart showing number of companies per key cluster over the years 2008, 2009, and 2010.](chart.png)

- Sources: The Decision Group database, available cluster reports and direct contact with cluster organizations -

Note: The UK cluster is defined as the East and Southeast of England, including London area; Check the radar diagram on p. 14 on compared progress.
**Performance indicator #2: Employment**

Nearly 70% of the employees in the Dutch lsh cluster work in companies with over 500 employees.

Employment in the Dutch lsh cluster increased with 0.5% from 24,255 (2009) to 24,385 (2010).

- Source: The Decision Group database -

see also www.lifesciencesoutlook.com
Performance indicator #2: Employment

The Dutch life cluster has remained stable in employment, however the best international key clusters show small growth.

Switzerland and Munich area show most constant growth in employment. The Dutch life cluster and 3 more key clusters showed small but continuous growth over the past 2 years.

- Sources: The Decision Group database, available cluster reports and direct contact with cluster organizations

Note: The UK showed largest growth due to improved reporting of UK cluster.
Performance indicator #3: Number of products

The Dutch devices & diagnostics in development steadily increased while drugs in development remained largely stable over the years.

The Number of products in development increased by 7% from 104 products in 2009 to 111 in 2010.

Medical devices include devices & diagnostics that alter or measure bodily functions. See for a detailed definition and overview Appendix B on Monitoring methodology.
The Dutch Ish cluster shows a small increase in the pipeline, similar to the UK cluster. The Munich area and Medicon Valley clusters showed an exceptional increase and 3 clusters remained at a similar level.

The Boston area has the largest number of products in development. Munich area converted many drugs from discovery to clinical phases and Medicon Valley improved reporting on their pipeline. The Dutch number excludes Philips products in development.

- Sources: The Decision Group database, available cluster reports and direct contact with cluster organizations -
Large companies (>250 employees) are responsible for nearly 90% of the total revenue of the Dutch Ish cluster.

The revenue of the Dutch Ish cluster decreased with 5% from 18.7b€ (2009) to 17.7b€ (2010) due to less Dutch revenue of large pharma.

Note: Data on Organon was available from the Chamber of Commerce in 2009. In 2010 data was not submitted by Organon. Revenue for 2010 is estimated based on yearly report of MSD and number of employees. Definition of cohorts by number of employees influence fluctuations in revenue over the years.
**Performance indicator #4: Revenue**

Revenue slightly decreased for the Dutch life science cluster, similar to the Munich area. Other international clusters showed some growth in revenue.

Revenue is at 4th position*, decrease in the Netherlands is caused by disappearance of Organon.

*In the NL data, revenue of Organon and Philips Healthcare account for half of the total revenue. The Chamber of Commerce gave specific data and the companies are headquartered in NL. For the other clusters it is unclear what part of the revenue of anchor companies, such as Roche in Switzerland, is exactly taken into account in the sources used.
Performance indicator #5: Public investments

In 2010 the CTMM, BMM and TiPharma programs were at their top and the Dutch Ish cluster benefited from the Innovation Credit program.

Public investments increased in 2010 with 19% from 248m€ (2009) to 297m€ (2010)*.

*Note: Public Investments are counted in the years in which the budget is allocated.
Performance indicator #5: Public investments

While in absolute terms the Dutch Life cluster outperforms most key clusters on Public investments, measured in percentage of GDP they are among the lowest and funding is expected to decline.

The public investments are 2nd highest compared to the key clusters in absolute terms.

- Sources: The Decision Group database, available cluster reports and direct contact with cluster organizations -
Performance indicator #6: Private investments raised

The Private investments raised, although volatile, are backed by a basis of milestone payments and venture capital investments.

Private investments raised decreased by 55% from 622m€ (2009) to 280m€ (2010), mostly due to a large PIPE deal in 2009 (JNJ – Crucell).

Sources: Press releases individual companies, NVP report April 2011
Performance indicator #6: Private investments raised

Private investments vary over the years in all clusters, largely due to a few large deals or offerings. Large acquisitions in Munich area, Switzerland, RTP area and Boston area dominate the private investments.

The Dutch Ish cluster is in fourth position compared to the international key clusters, outperforming 4 of the 7 key clusters on Private investments raised.

\[ \text{Private investments raised key clusters} \]

\[ \text{VC, IPO, FOPO, PIPE and milestone payments} \]

- Sources: The Decision Group database, available cluster reports, financial reports & website and direct contact with cluster organizations -

\[ \text{The international data include the major PIPE deals, IPOs and FOPOs from a range of sources. See also Appendix A monitoring methodology for a more detailed description of the main contributions to the performance indicators used in this Outlook.} \]
3 Monitoring Cluster Size

Key performance indicators: Number of companies & Employment
Performance indicator #1: Number of companies (1/3)

The core value chain of the Dutch Ish cluster mainly consists of companies with R&D activities in the Netherlands.

Part of the core value chain consists of “fully integrated” companies, that perform R&D, manufacturing, distribution and marketing & sales activities. Their share is expanding, see survey results on the cluster’s expectations of core activities in 2015.

![Core value chain of the Dutch Ish cluster](image-url)

- Source: The Decision Group database -

Note that companies can be counted in more than one category, depending on their activities.
Performance indicator #1: Number of companies (2/3)

Small companies show a steady growth over the years and comprise over half the size of the Dutch Ish cluster. A number of medium-sized companies crossed the 50 employee limit in 2011.

- Source: The Decision Group database; 2011 data has reference date October 2011 -
The Dutch lsh cluster continues growing with an average growth rate of 7.3% between 2005 and 2011 and a total increase of over 50% in 7 years.

- Source: The Decision Group database; 2011 data has reference date October 2011 -
**Performance indicator #2: Employment**

*The top 10 employers in the cluster provide 74% (17,982 employees) of total employment (24,384) in the Dutch Life cluster.*

<table>
<thead>
<tr>
<th>Company</th>
<th>Location / division</th>
<th>Employment 2009 (in NL)</th>
<th>Employment 2010 (in NL)</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. MSD</td>
<td>MSD</td>
<td>8675</td>
<td>8563</td>
<td>R&amp;D, manufacturing, marketing &amp; sales</td>
</tr>
<tr>
<td>2. Philips</td>
<td>Philips Healthcare</td>
<td>3353</td>
<td>3353</td>
<td>R&amp;D, manufacturing, marketing &amp; sales</td>
</tr>
<tr>
<td>3. Johnson &amp; Johnson</td>
<td>Johnson &amp; Johnson</td>
<td>1329</td>
<td>1585</td>
<td>R&amp;D, manufacturing, marketing &amp; sales</td>
</tr>
<tr>
<td>4. Medtronic</td>
<td>Janssen Biologics</td>
<td>1084</td>
<td>1084</td>
<td>R&amp;D, manufacturing, marketing &amp; sales</td>
</tr>
<tr>
<td>5. Abbott</td>
<td></td>
<td>958</td>
<td>986</td>
<td>R&amp;D, manufacturing, marketing &amp; sales</td>
</tr>
<tr>
<td>6. TEVA Pharmachemie</td>
<td></td>
<td>643</td>
<td>643</td>
<td>R&amp;D, manufacturing, marketing &amp; sales</td>
</tr>
<tr>
<td>7. Astellas Pharma</td>
<td></td>
<td>575</td>
<td>575</td>
<td>R&amp;D, manufacturing, marketing &amp; sales</td>
</tr>
<tr>
<td>8. DSM</td>
<td>DSM Biologics</td>
<td>403</td>
<td>403</td>
<td>R&amp;D, specialized research supplier, specialized research service provider</td>
</tr>
<tr>
<td>9. Novartis</td>
<td></td>
<td>400</td>
<td>436</td>
<td>R&amp;D, marketing &amp; sales</td>
</tr>
<tr>
<td>10. PURAC Biomaterials</td>
<td></td>
<td>354</td>
<td>354</td>
<td>R&amp;D, marketing &amp; sales</td>
</tr>
</tbody>
</table>

*Source: The Decision Group database*
Performance indicator #2: Employment impact of Organon and Abbott

Restructuring of Abbott and MSD operations\(^1\) in The Netherlands will decrease employment in the Dutch life science cluster, but will also provide opportunities and facilities for researchers to start their own company.

The Dutch cluster will shrink in size with 1,090 jobs\(^2\) (-4.5%) on the total 24,384 jobs, which is less than the expected loss of 2,675 jobs (-11%).

\(^1\) MSD management expects the restructuring of operations in NL to have less impact on employment

\(^2\) Assuming that all other factors remain unchanged (ceteris paribus).
Monitoring Cluster Output

Key performance indicators: Revenue & Number of products
Performance indicator #3: Number of products (1/2)

The top 20 companies with the most products in development is responsible for 64% of all products that are currently being developed in the Dutch Ish cluster (72 out of 111)¹.

<table>
<thead>
<tr>
<th>Company</th>
<th>Drugs¹ phase 1</th>
<th>Drugs phase 2</th>
<th>Drugs phase 3</th>
<th>Medical devices in development²,³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue Medical Devices</td>
<td></td>
<td></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Pantarhei Bioscience</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Medimate BV</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>MSD (Organon)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cavadis B.V. Utrecht</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Skyline Diagnostics</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Kiadis Pharma</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Solvay Pharmaceuticals</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Galapagos</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Akkolens</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>OctoPlus N.V.</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>PPD</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Agendia B.V.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Genmab B.V.</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>PanGenetics BV</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Prosensa</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ISA Pharmaceuticals B.V.</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Crucell</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Virosome Biologicals</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Emultech</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ The main sources for the number of drugs that companies have in development are the Thomson Pharma database, Medtrack, website searches, and Biotech Gate.

² The main source for the number of medical devices that companies have in development is website searches for the individual companies. Philips is not included in this list as no reliable estimate can be made based on available data on products in development and no open source is available on the number of products in development.

³ Medical Medical devices include devices & diagnostics that alter or measure bodily functions. See for a detailed overview Appendix B on Monitoring methodology.
Performance indicator #3: Number of products (2/2)

The Dutch Ish cluster has a strong representation of medical devices with a high throughput from development to on market stages¹.

¹ By nature medical devices, including devices & diagnostics that alter or measure bodily functions, progress faster through the pipeline than drugs.
Performance indicator #4: Revenue

Companies performing R&D activities contribute to nearly half the Revenue of the Dutch Lsh cluster.

9% of the Dutch Lsh cluster core value chain’s revenue comes from specialized research suppliers and service companies.

- Source: The Decision Group database -
The Dutch Ish cluster Revenue decreased in 2010 due to less revenue for MSD\(^1\) in the Netherlands. Reduced activities of Abbott and MSD are expected to lower Revenue further in 2011.

The cluster has shrunk slightly due to decreased revenue of MSD’s Dutch activities\(^1\). With announced dismissals cluster revenue is expected to decrease slightly further\(^2\).


\(^1\) MSD management has a more positive expectation of its revenue of Dutch operations

\(^2\) Assuming that all other factors remain unchanged (ceteris paribus)
Monitoring Cluster Input

Key performance indicators: Public investments & Private investments raised
Performance indicator #5: Public investments (1/2)

Public investments showed an increase in 2010 with an expected decline from 2011 onwards.

Source: AgentschapNL, Life Sciences & Health, news reports, program websites, government innovation budget 2012
For 2015 a decline in public investments of about 50% is expected when compared to 2010.

The graph shows the investments that have been granted (independent of when the funding is spend). The dashed blocks show the impact of the closing of the top institutes, assuming that all other investments remain at the level of 2010.

Source: AgentschapNL, Life Sciences & Health, news reports, program websites, government innovation budget 2012

1 The graph shows the investments that have been granted (independent of when the funding is spend). The dashed blocks show the impact of the closing of the top institutes, assuming that all other investments remain at the level of 2010.
**Performance indicator #6: Private investments raised (1/3)**

The total amount of Private investments raised is volatile, mainly due to fluctuation in milestone payments and the large Johnson & Johnson deals with Crucell in both 2009 and 2011.

In 2009 JNJ bought shares of Crucell for 302m€ and in 2011 JNJ acquired Crucell for the total amount of 1.7b€.

In the graph, 2011 prediction is based on the assumption that the increase in venture capital 2010-2011 is equal to the increase from 2009-2010 (Ceteris Paribus). See details on calculation in appendix A monitoring methodology. Other numbers for 2011 are actual until December 2011.

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1 Data for 2011 on Venture capital is not yet available. Depicted in the graph is 2011 prediction based on the assumption that increase in venture capital 2010-2011 is equal to the increase from 2009-2010 (Ceteris Paribus). See details on calculation in appendix A monitoring methodology. Other numbers for 2011 are actual until December 2011.
In 2009 and 2010 the companies in the cluster realized a high amount of potential value by signing strategic alliances.

While the companies in the Dutch Ish cluster signed additional Strategic alliances for 811m€ in 2009 and 342m€ in 2010, in 2011 only one alliance with a potential of 65m€ was signed.*

*Source: press releases individual companies, NVP report April 2011; moment of measurement October 2011

1 The Strategic alliances of Galapagos and Merck ended on 4-2-2011 but are included in the signed strategic alliances of 2009. The potential value of deals for the Dutch Ish cluster is calculated based on employment of the company in the Dutch cluster and therefore varies from the total value of the strategic alliances.
Performance indicator #6: Private investments raised (3/3)

Private investment raised by milestone payments decreased, but venture capital investment increased in 2010.

Milestone payments decreased from 65m€ (2010) to 43m€ (2011) with no IPO’s in 2011.

Milestone payments, Venture capital, IPOs, FOPOs excluding PIPEs

<table>
<thead>
<tr>
<th>Year</th>
<th>Milestone Payments</th>
<th>Venture Capital</th>
<th>IPO</th>
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<td>2007</td>
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<td>2011</td>
<td>215</td>
<td>161</td>
<td>161</td>
<td>11</td>
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</table>

Source: press releases of individual companies, NVP report April 2011

1 Data for 2011 on venture capital is not yet available. Depicted in the graph for 2011 is a prediction based on the assumption that increase in venture capital during 2010-2011 is equal to the increase from 2009-2010 (Ceteris Paribus). See details on calculation in Appendix A monitoring methodology. Other numbers for 2011 are up to date until December 2011.

see also www.lifesciencesoutlook.com
Survey results focus on 4 impact areas:
A. Cluster building
B. Investment climate
C. Public investment
D. Business knowledge
A - Survey results on impact area Cluster Building
The Dutch ISh cluster is expected to grow in both cluster size and output over the next few years. Respondents to the survey were less optimistic on the expected level of investments in 2015.

Around 50% of the respondents expect an increase in cluster size and cluster output, as well as in private investments. Public investments are expected to decrease.

Respondents in the core value chain have similar expectations though they are slightly more optimistic on employment growth and have lower expectations for input.

Analysis based on 43 respondents, 18 in the core value chain.

see also www.lifesciencesoutlook.com
Cluster Building – international comparison

Similar growth compared to the average growth of key international Lsh clusters is expected by the Dutch cluster.

More than half of the respondents expect the cluster to match the growth of key international clusters. Companies within the core value chain have similar expectations.

![Pie chart](chart.png)

**What do you expect of Dutch cluster performance in 2015 when compared to the average of key international clusters?**

- 36%: It will grow faster
- 54%: Growth will run parallel
- 4%: It will grow slower

Analysis based on 43 respondents, 18 in the core value chain
Investment climate – expectations of the Dutch life sciences & health cluster

Licensing is expected to become a major source of working capital by 2015 for companies in the core value chain. Subsidies and bank loans are expected to contribute less to working capital.

What are your main sources of working capital?

- Sales: 71% (2011), 79% (2015)
- Subsidy/Grant: 71% (2011), 86% (2015)
- Bank Loan: 64% (2011), 14% (2015)

Analysis based on 43 respondents, 18 in the core value chain

see also www.lifesciencesoutlook.com
Organizations in the Dutch Ish cluster and companies in the core value chain both have sales and subsidies/grants as their main sources of working capital in 2011.

- Organizations in the Dutch Ish cluster have sales, subsidies/grants, bank loans and VC investment as main sources of working capital in 2011.
- Main sources of working capital of companies in the core value chain in 2011 are sales, subsidies/grants, bank loans and VC investment.

Analysis based on 43 respondents, 18 in the core value chain.

**What are your organization’s main sources of working capital in 2011?**

- Sales: 30%
- Subsidy/Grant: 9%
- VC Investment: 15%
- Bank Loan: 17%
- Licensing: 7%
- Other (e.g. membership fees): 22%

Analysis based on 43 respondents, 18 in the core value chain.
Sales remains the most important source of working capital in 2015. Licensing is expected to become a more important source of working capital in 2015.

Organizations in the Dutch life sciences & health cluster expect sales, subsidies and licensing to be the most important sources of working capital in the cluster in 2015.

Companies in the core value chain expect sales and licensing to be the most important sources of working capital in 2015.

Analysis based on 43 respondents, 18 in the core value chain.
C - Survey results on impact area Public Investments
Public Investments – expectations of the Dutch life sciences & health cluster

The Dutch life sciences & health cluster is not optimistic on the decline of public funding and expects that it will be a problem for the cluster.

82% of companies in the core value chain expect the decline of public funding to be a problem for the Dutch life sciences & health cluster. Organizations in the cluster have similar expectations as the companies within the core value chain.

What effect do you expect the declining of public funding will have? Will it be a problem for the cluster?

- Yes, it will be a problem: 82%
- No, it will not be a problem: 18%

Analysis based on 43 respondents, 18 in the core value chain.
Public Investments – expected effects of decreased public funding

Continuity in innovation, research and product development, and growth of small companies is expected to be affected most as a result of decreased public funding.

The cluster expects a decrease in public funding will create most problems for product development and continuation of startup companies.

The decrease in public funding will be a problem, because

- Innovation, research and product development get under pressure (33%)
- Startups will get in trouble (26%)
- Competition on funding will increase (11%)
- Knowledge level will decrease (8%)
- Other (e.g. not enough funding, required for CAPEX) (22%)

Analysis based on 43 respondents, 18 in the core value chain
D - Survey results on impact area Business Knowledge
A slight majority of the companies in the Dutch life sciences & health (lsh) cluster and in the core value chain of the cluster expect a positive effect of the disappearance of large companies in the cluster.

82% of companies in the core value chain expect the decline of public funding to be a problem for the Dutch lsh cluster. Organizations in the cluster have similar expectations as the companies within the core value chain.
Growth in the Number of companies, increased innovation and opportunities for SMEs are among the expected positive effects of the disappearance of large companies in the Dutch life sciences & health cluster.

Besides growth in Number of companies, increased innovation and opportunities for SMEs are key positive effects of the disappearance of large companies.

Analysis based on 43 respondents, 18 in the core value chain.
A minority of respondents expects negative effects, among which a decline in Number of companies, attractiveness and expertise are mentioned, as well as decreased possibilities for partnering.

Survey respondent: “I have spend 15 years in the US - we have gone through ups and downs, buyouts, layoffs, mergers etc. All buyouts have resulted in additional small biotechs mushrooming. Seattle has a great grassroots movement in R&D up to commercial - however every time a company has reached launch, they have been bought out. Leiden (that I know best) seem to have the same DNA as Seattle - a great University with strong life sciences, an attractive BioScience park with infrastructure and NL has improved its taxcode considerably with the Innovatiebox and likewise the 30% box for personal income tax. The government sponsored Senternovem is another attractive incentive to support company growth. Just a few observations from ‘the outside.’”
Appendices

A. History, development and structure of the Dutch Life Sciences Outlook 67
B. Monitoring methodology 78
C. About the involved partners 105
D. Bibliography 108
E. Glossary of terms 112
F. Consulted experts and organizations 118
Appendix A – History, development and structure of the Dutch Life Sciences Outlook

Using the entrepreneurs’ perspective
**Focus of the Dutch Life Sciences Outlook 2012**

**Building on the Dutch Life Sciences Outlook 2010 & 2011, this edition focuses on forecasting the performance of the Dutch life sciences cluster.**

For ongoing analysis on the cluster progress, check the website of The Decision Group (www.thedecisiongroup.nl) or contact the researchers.

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Partners to create the Dutch Life Sciences Outlook 2012

The Life Sciences & Health innovation program and The Decision Group proudly present the third edition of the yearly Outlook on the Dutch Life Sciences cluster.

The Outlook is commissioned by the ‘Life Sciences & Health’ innovation program.

Driven by the cluster and empowered by the Ministry of Economic Affairs, the LSH program has the objective to improve the life sciences innovation and investment climate in the Netherlands. The Outlook is part of the four-year work plan.

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The Outlook is created in cooperation with the Grenoble School of Management

The Outlook is created in cooperation with the School of Public Health, part of The George Washington University.

The Outlook is created in cooperation with the Stockholm School of Economics

Contact: Prof. dr Fred van Eenennaam

The Decision Group helps clients take better strategic decisions, using methods such as the strategic dialogue and strategic alignment. The creation of the Outlook is supervised by Ir Maarten Koomans, managing partner of The Decision Group.

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see also www.lifesciencesoutlook.com
# International Academic Advisory Council

The International Academic Advisory Council¹ is installed, with the members providing advice on the development of the Outlook, cluster policies and methodology development.

<table>
<thead>
<tr>
<th>Christian H.M. Ketels</th>
<th>Victor de Margerie</th>
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<tr>
<td>Principal Associate Harvard Business School</td>
<td>Professor at Grenoble School of Management</td>
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<td>Dr. Christian Ketels is a member of the Harvard Business School faculty at Professor Michael E. Porter’s Institute for Strategy and Competitiveness and Director of The Competitiveness Institute (TCI), a global network of professionals interested in competitiveness and cluster development.</td>
<td>Dr. de Margerie is specialized in strategy, technology management and corporate governance and holds various management and executive positions in Germany, France and the USA in multinational industrial groups. She holds numerous positions in boards of listed companies.</td>
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<tr>
<th>Göran Lindqvist</th>
<th>Robert E. Burke</th>
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<tr>
<td>Principal Associate at the Center for Strategy and Competitiveness (CSC) at the Stockholm School of Economics and Cluster Observatory project manager. His research focuses on agglomerations, clusters, cluster initiatives, and cluster policy.</td>
<td>Professor at the George Washington University</td>
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<tr>
<td>Professor Burke is a medical sociologist and a nationally known expert in long-term care, with extensive experience in developing, evaluating and implementing health care policy and managing multidisciplinary professional staff.</td>
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<tr>
<th>Leonard H. Friedman</th>
<th>Fred van Eenennaam</th>
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<tr>
<td>Professor at the George Washington University</td>
<td>Professor of Strategy and Dynamics of Strategy</td>
</tr>
<tr>
<td>Dr. Leonard Friedman is an expert on the mechanisms of organizational change and strategic decision-making in health service organizations.</td>
<td>Professor Fred van Eenennaam is an expert on corporate governance &amp; strategy. He is also well known for his expertise in the life sciences and healthcare industry.</td>
</tr>
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</table>

¹The council meets twice a year with Prof. dr. Fred van Eenennaam as chair and Ir. Roald van Leeuwen as secretary of the council.
*The High Profile Group (HPG) is made up of highly regarded professionals that are noted for their achievements in business, science and politics. The HPG was formed to advise on future organization and direction of the Dutch Life Sciences & Health Initiative and gives recommendations regarding the opportunities, hurdles and future of the sector.
Methodology development (2/3)

The Life Sciences Outlook continuously develops with regard to the academic grounding, the involvement of entrepreneurs and the methodology.
Methodology development (3/3)

The Life Sciences Outlook 2012 edition has more focus on forecasting and methodology was reconfirmed internationally and by various academic insights.

* On August 29, 7 affiliates of the Microeconomics of Competitiveness (MoC) network of Prof. Michael Porter of Harvard Business School, took the initiative to found a European Chapter of the network
What is the structure of the Dutch Life Sciences Outlook?

Monitoring of the cluster success and key business impact areas is used to improve the cluster compared to international key Ish clusters.

**Monitoring**
- Dutch Ish cluster; Cluster success
  - Measuring performance and progress
- Dutch Ish cluster; Key business impact areas
  - Strategic assessment of progress

**Improving**
- Dutch Ish cluster; Key recommendations
  - Improving the Dutch Ish cluster compared to selected international key Ish clusters.

Dutch Ish cluster; Cluster success
- Measuring performance and progress

Dutch Ish cluster; Key business impact areas
- Strategic assessment of progress

Dutch Ish cluster; Key recommendations
- Improving the Dutch Ish cluster compared to selected international key Ish clusters.
Why is a successful cluster of importance?

The focus of the Outlook is on the perspective of entrepreneurs. Entrepreneurs are more successful when they operate in an internationally successful trading cluster with a strong local dynamic.

The Diamond Model by Prof. Michael Porter can be used to assess the competitiveness of clusters.

Prof. Fred van Eenennaam and Prof. Michael Porter jointly work on the application and development of cluster theory.

Prof. M. Porter and prof. Fred van Eenennaam are involved in leading research on the development of economic cluster assessment with the international MOC network and research on micro competitiveness.

Prof. F. van Eenennaam is co-chairman of the global impact council of the Microeconomics of Competitiveness initiative under the leadership of Prof. Porter's Institute of Strategy and Microeconomics of Competitiveness of Harvard Business School, to which 80 universities and business schools from around the world are affiliated.

- For ongoing analysis on the cluster progress, check the website of The Decision Group (www.thedecisiongroup.nl) or contact the researchers -

see also www.lifesciencesoutlook.com
Further development of monitoring methodology

The focus of this year has been to improve forecasting on the Dutch life science cluster.

1) CHOICES
Choice of the key performance indicators

Actions/adjustments:
- The KPIs were validated by results of the European Commission project: EU Biocluster Project "Regional Biotechnology"
- The KPIs are used as starting points for a European Cluster assessment project
- Connection is made with cluster observatory

2) DEFINITIONS
Definitions of the key performance indicators

Actions/adjustments:
- Wider cluster definition to take the context of the cluster more into account
- Adjusted & validated definitions (e.g. addressed issue of related industries)
- Focus in monitoring on core value chain of the cluster to capture the core of the cluster

3) MEASURING
Data collection for the key performance indicators

Actions/adjustments:
- Development of firm by firm checked database (1000+ companies checked)
- Use of all available Chamber of Commerce data on employees, companies and revenue (5000+ records checked)
- Review of all press releases of publicly known strategic alliances of Dutch companies
- Cross checks of data with 100+ data sources
- Used data from 10 individual international cluster organizations
Cooperation is started within an international network of life sciences clusters to create an internationally validated methodology for cluster monitoring.
Appendix B – Monitoring methodology
The Monitoring methodology of the Life Sciences Outlook consists of: 1) choices, 2) definitions, and 3) measuring of the key performance indicators.

1) CHOICES
Choice of the key performance indicators

The key performance indicators are selected to best reflect the success of the Dutch life cluster:

- Cluster Size
  1. Number of companies
  2. Employment
- Cluster Output
  3. Number of products
  4. Revenue
- Cluster Input
  5. Public investments
  6. Private investments raised

2) DEFINITIONS
Definitions of the key performance indicators

The key performance indicators are defined to best reflect the success of the Dutch life cluster:

3) MEASURING
Data collection for the key performance indicators

The data collection methodology is set up to provide accurate measurements:

see also www.lifesciencesoutlook.com
What are the choices of the key performance indicators?

The overall Dutch life science cluster success is measured using three value drivers and six key performance indicators.

**Cluster size**
1. Number of companies (#)
2. Employment (employees)

**Cluster output**
3. Number of products (#, drugs, devices, technologies)
4. Revenue (€)

**Cluster input**
5. Public investments (€)
6. Private investments raised (€)

DEFINITIONS
MEASURING
CHOICES

see also www.lifesciencesoutlook.com
How are the key performance indicators selected? (1/2)

Choices are based on desk research, literature studies and an extensive strategic dialogue with entrepreneurs and academic partners.

Set DIRECTION
- Interviews round 1
  - Research & analysis
  - Gather sector opinions and validation

Create FOCUS
- Interviews round 2
  - Research & analysis
  - Validation and fine tuning

Fix FRAMEWORK
- Seminar
  - Research & analysis
  - Analysis and draft

Validate RESULTS
- Validate in field
  - Analysis

DEFINITIONS
MEASURING
CHOICES

Present Business impact areas:
Life Sciences Healthcare Event 2009
Opening Nyenrode Life Sciences & Health Care Institute

phase 1 phase 2 phase 3 phase 4
How are the key performance indicators selected? (2/2)

Choices are validated in 2010 by various academic contacts, business experts and other researchers.

Academic REFLECTION    Set Academic COUNCIL    Validate METHODOLOGY

Final check in field    Reflection with Academic partners    Validation of KPIs with academic council    Validate methodology

Presentation to high profile group    CEBR Meeting Cambridge

Sep-Oct '09    Nov 4 '09    Jun-Sep '10    Nov 29 '10    Jan '11

phase 5    phase 6    phase 7    phase 8    phase 9

Dutch Life Sciences Outlook KPI’s were confirmed by result of research for EU: Establishing a methodology and performance indicators for assessing bioclusters and bioregions relevant to the KBBE area.

see also www.lifesciencesoutlook.com
What were design considerations?

The main goal of the design was to find a set of indicators that will help to improve the cluster success.

All choices made to select the performance indicators are based on the added value for entrepreneurs.

**Scope**
- The scope of the Dutch Life Sciences Outlook is the Dutch Ish cluster.

**Aim**
- The performance indicators monitor success. This way the performance indicators directly match the experience of entrepreneurs. There is a clear distinction compared to other cluster monitors like the 12 pillars of competitiveness used in the Global Competitiveness Index of the World Economic Forum. There, competitiveness involves the factors that enable a nation or cluster to be successful. (“We define competitiveness as the set of institutions, policies, and factors that determine the level of productivity of a country”, The Global Competitiveness Report 2008-2009, World Economic Forum).

**Focus**
- The focus of the Dutch Life Sciences Outlook is on economic and social success of the Dutch Ish cluster, as scientific success is the focus of others like the Dutch Royal Academy of Sciences (KNAW). The Academic council has been discussing to add a measure on patents.
- The combined set of performance indicators gives insight in the success of the entrepreneurs in the Dutch Ish cluster.

**Use**
- To ensure that the performance indicators is practical for policy makers, a small controllable set of performance indicators is selected that can be influenced and steered upon.

**Tuning to Dutch Ish**
- High social interests in new healthcare products (performance indicator “Number of products”).
- Taking into account the stage of development of the Dutch Ish cluster (performance indicators “Number of companies” and “Employment”)”
- Relatively high dependence on private and public investments in biotech, due to the large and high-risks involved in their R&D (performance indicators “Public investments” and “Private investments raised”).

**Validation**
- The approach has been validated in the field by 40+ expert interviews, seminar with 300 participants, academic reflection and tested with finished report 2010.

see also www.lifesciencesoutlook.com
What was the starting point for selecting the six key performance indicators?

The six key performance indicators were selected from in total over 50 different indicators, resulting from international best practices and academic literature.

<table>
<thead>
<tr>
<th>Six performance indicators</th>
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<tr>
<td><strong>Cluster Size</strong></td>
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<td>1. Number of companies</td>
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<td>2. Employment</td>
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<td><strong>Cluster Output</strong></td>
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<td>3. Number of products</td>
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<td>4. Revenue</td>
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<td><strong>Cluster Input</strong></td>
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<td>5. Public investments</td>
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<td>6. Private investments raised</td>
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</table>
The Dutch life sciences cluster contains all companies that 1) perform R&D on products or 2) manufacture products that alter or measure bodily functions (human or animal) aimed at improving health effects, including supporting and related industries, with direct focus on these companies.

The Life Sciences Outlook monitors the Dutch life sciences cluster, which includes red biotech, medical technology and the pharmaceutical industry, and overlaps several other clusters.\(^1\)

\(^1\)Based on the cluster theory M. Porter – Harvard Business School.
The Dutch Life Sciences Outlook focuses on the value chain of the Dutch Ish cluster.

**Definitions**

**Value Chain**
(companies or organization with activities that directly contribute to the development of products aimed at improving health effects)

**Suppliers**
(e.g. lab equipment, power supply, water supply)

**Service Providers**
(e.g. legal, consultants, bank)
The Dutch Life Sciences Outlook focuses on the core value chain.

**Suppliers**
- Bioelectronics, Bioinformatics
- Analysis Software
- Medical Equipment
- Laboratory Equipment
- Ophthalmic Goods
- Diagnostic Substances
- Containers and Packaging
- Chemical Products

**Value Chain**
- Care and Cure providers
  - Teaching and Specialized Hospitals
- Distribution
- Marketing & Sales
- Manufacturing
- R&D companies
  - Drugs and Medical Device companies
  - (Pharma, Biotech, Medical Engineering)
- Specialized Research service providers
  - Contract Manufacturing Organizations
  - Contract Research Organizations
  - Clinical studies
  - Synthesis services
- Specialized Research suppliers
- Translational Research
  - TiPharma, BMM, CTMM
- Fundamental Research
  - NGI, Hubrechts Institute
- Educational Institutions
  - Universities

**Service Providers**
- Cluster Organizations
  - Niaba, Nefarma, Biofarmind, LSH
- Regulation
  - CCMO, METCs, FDA, EMA
- Reimbursement
  - Healthcare Insurance companies, VWS dep of GMT
- Specialized Business Services
  - Banking, Accounting, Legal
- Specialized Risk Capital
  - VC Firms, Angel Networks
- Health Insurance
  - Laboratory, Clinical Testing

Definitions - focus (2/2)

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see also www.lifesciencesoutlook.com
The value chain consists of the main activities that enable the development, production and use of new drugs and medical technologies.

<table>
<thead>
<tr>
<th>Specialized research suppliers</th>
<th>Specialized research services</th>
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<tr>
<td>• Supplying biochips</td>
<td>• Contract manufacturing</td>
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<td>• Supplying bioelectronics</td>
<td>• Contract research</td>
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<td>• Supplying bioinformatics</td>
<td>• Drug delivery</td>
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<th>Marketing &amp; sales</th>
<th>Distribution &amp; storage</th>
<th>Care &amp; Cure providers</th>
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<td>• Business courses</td>
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- Illustrative purpose -
Performance indicator 1: Number of companies (1/3)

Performance indicator 1 is defined as companies in the core value chain of the Dutch Ish cluster that 1) perform R&D or 2) manufacturing ...

Companies in the core value chain of the Dutch Ish cluster

**Definition**

The Dutch Ish cluster contains all companies that perform R&D of products or manufacture products that alter or measure bodily functions (human or animal) aimed at improving health effects, including supporting and related industries, with direct focus on these companies.

- Veterinary companies are included in this definition.
- Companies that develop medical devices based on engineering are included.
- Blue and green biotechnology companies are not included.
- Nutriceutical companies that are on the intercept between the green and red biotechnology are not included.

**Rationale**

The Dutch Ish cluster is defined according to the cluster theory of Prof. Michael Porter.

**Perform R&D or manufacturing**

**Definition**

R&D: “Creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications” (OECD)

Manufacturing “is defined as the physical or chemical transformation of materials of components into new products, whether the work is performed by power-driven machines or by hand, whether it is done in a factory or in the worker's home, and whether the products are sold at wholesale or retail. Included are assembly of component parts of manufactured products and recycling of waste materials.” (UN)

**Rationale**

Companies that perform R&D and manufacturing are part of the core value chain of the Dutch Ish cluster, which focuses on being a breeding ground for high-tech innovation.

---

1 International Standard Industrial Classification of All Economic Activities, Revision 3, United Nations, 1990, Series M, No. 4, Rev. 3.
Performance indicator 1: Number of companies (2/3)

or 3) offer specialized research services or 4) are specialized research supplier ...

Definition
Specialized Research Service Providers
are companies whose core business is to deliver services specifically aimed at the research activities performed by the R&D companies in the core value chain. Examples are product development services, analytical services, screening, contract manufacturing and contract R&D to the life science industry, as well as the development of platform technologies.

Rationale
The relatedness between companies that are specialized research suppliers and the R&D companies is very strong. Companies that provide Specialized Research Services give an essential contribution to the success of the cluster and are often high-tech innovative companies.

Definition
Specialized Research Suppliers
are companies whose core business is to supply products specifically to the R&D companies in the core value chain.

Rationale
The relatedness between companies that are specialized research suppliers and the R&D companies is very strong. The companies contribute to the total revenue of the cluster and are often high-tech companies themselves.

see also www.lifesciencesoutlook.com
Performance indicator 1: Number of companies (3/3)

...that are dedicated or diversified private companies within the Netherlands.

**dedicated or diversified**

**Definition**
Two types of companies are distinguished:

1. **Dedicated** companies that only perform activities in LS&H
2. **Diversified** companies that perform activities outside of LS&H

Both type of companies are included.

**Rationale**
Diversified companies are included, because they contribute to the LS&H cluster. Their revenue, employment, and number of products is only counted for the fraction of their activities in LS&H.

**private companies**

**Definition**
A legal entity, registered in the Dutch Chamber of Commerce.

- When a company has several offices in The Netherlands, this is counted as 1 company in the number of companies.
- Companies that are taken over by another firm are no longer counted as a separate company.

**Rationale**
The performance indicator counts independent legal entities. The number of offices provides no additional insight in the success of the cluster.

**The Netherlands**

**Definition**
Companies that perform core value chain activities in the Netherlands.

In practice, a company is included if it has a department in the Netherlands in which these activities take place. Life Sciences Outlook includes:

1. An R&D office in the Netherlands of a non-Dutch multinational.
2. Trust offices of multinationals that only function as an administrative office are not included.

**Rationale**
Foreign companies with offices in the Netherlands provide an important contribution to the cluster, unless they are trust offices.

see also www.lifesciencesoutlook.com
**Performance indicator 1: Number of companies**

The number of companies in the Dutch Ish cluster in 2010 is based on The Decision Group database 2012.

### Main assumptions and consistency checks

No assumptions were made for performance indicator 1.

### Methodology

- Number of companies in the Core Value Chain NL 2010
  - 329

  1. Number of manufacturing companies
    - 70
  2. Number of R&D companies
    - 213

  3. Number of specialized research service providers
    - 148
    - 148
    - 3

  4. Number of specialized research suppliers
    - 92
    - 92
    - 3

**1**The different types of companies do not add up to 329 as several companies are counted in more than one category.

### Sources

1. The Decision Group database 2012
2. Contact NGI, TTOs, science parks
3. Chamber of Commerce

see also www.lifesciencesoutlook.com
Performance indicator 2: Employment

**Performance indicator 2 is defined as the employment of all companies in the cluster including all offices in the Netherlands, for the part of their activities in Dutch Ish cluster.**

**Definition**

The employment of all companies included in the Number of companies (key perf. indicator 1) is taken into account.

**Definition**

The employment of all offices located in the Netherlands is included, independent of the activities of the offices.

Personnel in the marketing and sales department of a pharmaceutical company is not included, as the Outlook focuses on activities that directly contribute to the development of products aimed at improving health effects.

**Definition**

The employment is only included for activities in life sciences & health. The employment for activities that are not in life sciences & health are not included. For example: for Philips, only the employment of Philips Healthcare is included.

**Rationale**

The combined group of employees of the companies in the core value chain of the cluster is an essential asset of the cluster which enables startup of new companies and growth of the cluster.

**Rationale**

Company provides an important contribution to the LS&H cluster (e.g. it creates a pool of experienced management that can work in LS&H).

**Rationale**

Only the employment related to activities in life sciences & health gives an indication of the success of the Dutch Ish cluster.
Performance indicator 2: Employment

Employment of the Dutch Ish cluster in 2010 is based on data from the Chamber of Commerce.

Main assumptions and consistency checks

- Companies for which no employment data is available in the Chamber of Commerce are assumed to have one employee.

Methodology

All employment data is in thousands of employees for 2010.

Sources

1. Chamber of Commerce data
2. Per company check of annual reports and websites (for the top 10)

The values can appear erroneous due to rounding.
**Performance indicator 3: Number of products (1/2)**

**Number of products, performance indicator 3, is defined as the: number of drugs and medical devices...**

The number of drugs and medical devices...

**Definition**

Products developed by R&D companies in the Dutch life science cluster can be divided in 2 categories:

1. **Drugs**: a drug, broadly speaking, is any substance that, when absorbed into the body of a living organism, alters normal bodily functions (WHO).

2. **Medical devices**: “Medical device” means any instrument, apparatus, implement, machine, appliance, implant, in vitro reagent or calibrator, software, material or other similar or related article, intended by the manufacturer to be used, alone or in combination, for human beings for one or more of the specific purposes of (WHO):
   - diagnosis, prevention, monitoring, treatment or alleviation of disease
   - diagnosis, monitoring, treatment, alleviation of or compensation for an injury
   - investigation, replacement, modification, or support of the anatomy or of a physiological process
   - supporting or sustaining life

3. **Technology platform**: technology that enables the creation of, products that directly support product development.

**Proxy**

The focus of the Life Sciences Outlook is on monitoring drugs and medical devices and not on technology platforms.

**Rationale**

Drugs and medical devices are end products that are directly for or used by patients, whereas technology platforms are business to business products with indirect impact on the well-being of patients.

see also www.lifesciencesoutlook.com
in development within the Netherlands.

**Definition**
The following phases of drug development exist:
1. Pre-clinical phase
2. Phase I
3. Phase II
4. Phase III
5. On market

Medical devices are counted as individual devices if they provide a different added value aimed at improved health effects (e.g., devices that are distinguished by different software versions without added health effects are not counted as separate devices).

**Proxy**
The focus of the Life Sciences Outlook is on drugs in phase I-III and medical devices in development. The product phases are defined in line with the definition of the FDA/EMA.

**Rationale**
On-market products are not included, as the added value of R&D on market products is relatively low.

**Definition**
The Life Sciences Outlook focuses on products for which research and development activities take place within The Netherlands. In practice this means that a company must have at least one R&D division within the Netherlands. The products of multinationals with an office in the Netherlands that do not perform R&D in the Netherlands are not included.

**Rationale**
To obtain good insight in the productivity of the Dutch life cluster, only products that are researched and developed in the Netherlands are included.
Performance indicator 3: Number of products

The number of products for Dutch ISH companies are calculated on the level of the individual companies in the core value chain.

Main assumptions and internal and external validity checks

- **b** It is assumed that the Thomson Pharma database is complete regarding the number of drugs in development phase I, II, III. Companies that are not listed in this database are assumed not to have drugs in phase I, II, III.

- **c** It is assumed that medical device companies provide a complete overview of the products they have in development on their websites.

Methodology

1. **Number of products NL 2010**: 111
2. **Drugs in development phase I, II, III**: 56
3. **Medical devices in development**: 55

Sources

1. Thomson Pharma, Individual company websites, The Decision Group database, Medtrack
2. Individual company websites, The Decision Group database

1 The values can appear erroneous due to rounding.
Performance indicator 4: Revenue

Performance indicator 4 is defined as: The revenue of all companies in the core value chain of the Ish cluster coming from activities in life sciences & health that are taxed in the Netherlands.

**The revenue of all companies in the core value chain of the Ish cluster**

Definition
Revenue is the total amount of money received by a company registered in the Netherlands for goods sold or services provided during a certain time period. It also includes all net sales, exchange of assets; interest and any other increase in owner’s equity and is calculated before any expenses are subtracted (based on Investorword 2010).
Main sources of revenue are product sales, license deals and government grants.

Rationale
The revenue of all R&D companies included in the Number of companies (perf. indicator #3) is taken into account.

**activities in life sciences & health**

Definition
Revenue is only included from activities in life sciences & health. The revenue from activities that are not in life sciences & health are not included. For example: for Philips, only the revenue of Philips Healthcare is included.

Rationale
Only the revenue of activities in or related to life sciences & health give an indication of the success of the Dutch Ish cluster.

**taxed in the Netherlands**

Definition
Corporate tax refers to a direct tax levied on the profits made by companies or associations and often includes capital gains of a company. Earnings are generally considered gross revenue minus expenses.

Rationale
Only the revenue of companies that pay taxes in the Netherlands contributes to the Dutch economy.
Performance indicator 4: Revenue

Revenue data is based on Chamber of Commerce data per individual company and cross checked with annual reports for large companies.

Main assumptions and consistency checks

For the calculation of company revenue it is assumed that medium-sized companies have on average a revenue between 8.8 and 35m€ and small companies have on average a revenue between 0 and 8.8m€, according to categories used by the Dutch Chamber of Commerce.

Methodology

\[ f(x) = (35-8.8) \times \left( \frac{x - 50}{250-50} \right) \]
\[ g(x) = 8.8 \times \left( \frac{x}{50} \right) \]

1 The values can appear erroneous due to rounding.

Sources

1 Chamber of Commerce data, per company
2 Company annual reports

see also www.lifesciencesoutlook.com
Overview of public and private investments raised for companies in the core value chain of the Dutch life cluster

Adapted from: MaRS BioEntrepreneurship Lecture Series Strategic Financing in Biotechnology, Roman Masley, SHI Capital

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see also www.lifesciencesoutlook.com
**Performance indicator 5: Public investments**

**Public investments, performance indicator #5, is defined as public investments in translational research and in companies in the core value chain of the Dutch Ish cluster.**

**Public investments**

**Definition**
Public investments are investments made by the government using any available financial instrument, such as funding, grants, subsidies, and fiscal incentives.¹

**Proxy**
The Life Sciences Outlook includes all public investments dedicated to the Ish cluster. For general investments a materiality² cut-off is used of 1%: only general investments above this cut-off are included in performance indicator #5.

**Rationale**
Public investments provide a direct measure of the dedication of a government to a specific sector.

---

**Translational research**

**Definition**
Translational research involves moving knowledge and discovery gained from the basic sciences to its application in clinical and community settings.

**Proxy**
The focus of the Life Sciences Outlook is on public investments in PPPs.

**Rationale**
PPP are considered closely linked with the activities of companies in the core value chain.

---

**Companies in the core value chain of the Ish cluster**

**Definition**
The core value chain is defined as companies that perform R&D, manufacturing, specialized research service providers, and specialized research suppliers.

**Rationale**
Public investments in companies in the core value chain have direct impact on the economic performance of the Dutch Ish cluster.

---

¹Investments counted are those that have been granted. In the calculation of the performance indicator, funding is equally distributed over the years for which it is intended to be used, even though the budget spending per year can differ.

²Based on the 1989 definition International Accounting Standard Committee (IASC).
Performance indicator 5: Public investments

Public investments in the Dutch Ish cluster in 2009 and 2010 were included at the individual program and subsidy level and checked with the individual institutions.

| Main assumptions and consistency checks | No assumptions were made to calculate the public investments. |

Methodology

All monetary amounts are in m€ for 2010.

- Public investments NL 2010: 297
- Matching investments in PPPs by knowledge institutes: 68
- Public investments in PPPs: 150
- Subsidies: 79

1 The values can appear erroneous due to rounding.

Sources

1. AgentschapNL, NGI, LSH
2. Individual websites of subsidies and programs
Performance indicator 6: Private investments raised

Private investments raised is defined as the private investments raised (M€) by companies in the core value chain of the Dutch Life Sciences (LS&H) cluster.

**Definition**

Private investments raised is the commitment of private money or capital to the purchase of financial instruments or other assets so as to gain profitable returns in the form of interest, income (dividend), or appreciation of the value of the instrument.

Private investments raised by the companies in the Dutch Life Sciences cluster include: Business Angel investments, Venture Capital investments, Venture debt and Royalties, Initial Product Offerings (IPOs), Private Investment in Public Equity (PIPEs), Follow-on Public Offerings (FOPOs), and Strategic Alliances.

**Proxy**

The Life Sciences Outlook uses all private investment raised mentioned above except business angels investments and strategic alliances that are not publically known.

**Rationale**

Business angels investments and strategic alliances that are not publically known are assumed to be relatively small compared to the total private investments in the cluster and it proves very difficult to find reliable data.


<table>
<thead>
<tr>
<th>Definition</th>
<th>companies in the core value chain of the LS&amp;H cluster</th>
</tr>
</thead>
<tbody>
<tr>
<td>The core value chain is defined as companies that perform R&amp;D, Manufacturing, Specialized Research Service Providers, and Specialized Research Suppliers</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Proxy</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Life Sciences Outlook calculates an investment in a company as an investment in the cluster if the headquarters is in the cluster. For companies with their headquarters outside the cluster, the investment is calculated based on the % of employees working in the Dutch cluster.</td>
<td>Private investments in companies in the core value chain have the most direct impact on the economic performance of the Dutch Life Sciences cluster. Companies with headquarters and activities in the cluster will allocate a significant part of the investment in the cluster.</td>
</tr>
</tbody>
</table>
Performance indicator 6: Private investments raised

Private investments raised are based on an extensive scan of press releases of companies in the cluster and data from the Dutch Private Equity & Venture Capital Association (NVP).

Main assumptions and consistency checks
- **X**: Strategic alliances include milestone payments that are publicly available. Assumption is that most large milestone payments are made public.
- **Y**: Private Investment in Public Equity (PIPEs) or Follow-on Public Offerings (FOPOs) are addressed by a company in their press releases.
- **Z**: The definition of the NVP is wider than that of the Life Sciences Outlook, checked with NVP estimate is made of the % of overlap. Difference is caused by wider definition of NVP on medical applications.

Methodology
- All monetary amounts are in m€ for 2010

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total private investments NL 2010</td>
<td>257 273 241</td>
</tr>
<tr>
<td>Strategic alliances milestone payments</td>
<td>65</td>
</tr>
<tr>
<td>Venture capital</td>
<td>145 161 129</td>
</tr>
<tr>
<td>Initial Public Offerings (IPOs)</td>
<td>0</td>
</tr>
<tr>
<td>Follow-on Public Offerings (FOPOs)</td>
<td>28</td>
</tr>
<tr>
<td>Private Investment in Public Equity (PIPEs)</td>
<td>20</td>
</tr>
<tr>
<td>Venture Capital Life Sciences sector</td>
<td>161</td>
</tr>
</tbody>
</table>

1 The values can appear erroneous due to rounding.

Sources
- **2**: The Decision Group database 2010 and NVP consulted (NVP defined life sciences as biotechnology, biofarmacy, medical applications and nutrition).
- **3**: Press releases search on internet
- **4**: Press releases search on website of all listed core value chain companies in the cluster

see also www.lifesciencesoutlook.com
Appendix C – About the involved partners
The Life Sciences & Health Innovation Program

The main objective of this innovation program (referred to as ‘LSH’) is to capitalize on knowledge by stimulating growth of this important sector of the Dutch economy.

Driven by the cluster and empowered by the Ministry of Economic Affairs, the LSH program has the objective to improve the life sciences innovation and investment climate in the Netherlands. The Outlook is part of the four-year work plan.

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About The Decision Group

The Decision Group is a niche strategy consulting firm founded in 1996 and with an industry focus on the healthcare & life science industry.

The Outlook is created in cooperation with consulting firm The Decision Group.

The Decision Group helps clients take better strategic decisions, using methods such as the strategic dialogue and strategic alignment. The creation of the Outlook is supervised by prof. dr. Fred van Eenennaam & ir Maarten Koomans, managing partner of The Decision Group.

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see also www.lifesciencesoutlook.com
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See the respective Outlooks for the references of the Biotech Outlook 2010 and the Life Sciences Outlook 2011
Appendix E – Glossary of terms
**Glossary of terms (1/3)**

**Biotechnology:**

The OECD has developed both a single definition of biotechnology and a list-based definition of different types of biotechnology (see box below). The single definition defines biotechnology as “the application of science and technology to living organisms, as well as parts, products and models thereof, to alter living or nonliving materials for the production of knowledge, goods and services.”

**Biotechnology (list-based definition):**

- OECD list-based definition of biotechnology techniques.
- DNA/RNA: Genomics, pharmacogenomics, gene probes, genetic engineering, DNA/RNA.
- Sequencing/synthesis/amplification, gene expression profiling, and use of antisense technology.
- Proteins and other molecules: Sequencing/synthesis/engineering of proteins and peptides (including large molecule hormones); improved delivery methods for large molecule drugs; proteomics, protein.
- Isolation and purification, signaling, identification of cell receptors.
- Cell and tissue culture and engineering: Cell/tissue culture, tissue engineering (including tissue scaffolds and biomedical engineering), cellular fusion, vaccine/immune stimulants, embryo manipulation.
- Process biotechnology techniques: Fermentation using bioreactors, bioprocessing, bioleaching, biopulping, biobleaching, biodesulphurisation, bioremediation, biofiltration and phytoremediation.
- Gene and RNA vectors: Gene therapy, viral vectors.
- Bioinformatics: Construction of databases on genomes, protein sequences; modelling complex biological processes, including systems biology.
- Nanobiotechnology: Applies the tools and processes of nano/microfabrication to build devices for studying biosystems and applications in drug delivery, diagnostics etc.
**Glossary of terms (2/3)**

**Life Sciences companies:**

“Those companies that apply the possibilities of organisms, cell cultures, parts of cells or parts of organisms, in an innovative way for the purpose of industrial production. They may also supply related services and hardware and software.” (source: *Action Plan Life Sciences*, Ministry of Economic Affairs).

“Existing technological fields, including biotechnology, pharmacology, biology, chemistry, physics and informatics, are integrated into this definition” (source: *Action Plan Life Sciences*, Ministry of Economic Affairs).

**Dedicated biotech companies:**

Those companies that have their core activities in biotech. This can be R&D, services, manufacturing/producing, supplying/distributing.

**Red Biotech:**

Biotechnology with applications in health care.

**White Biotech:**

Biotechnology with industrial applications.

**Green Biotech:**

Biotechnology with applications in food or agriculture.

**Medical technology companies:**

Medical technology companies are involved in research, development, production and marketing of systems and devices for medical applications in humans and animals. (source: Biotech Gate). See also page 95.
**Glossary of terms (3/3)**

**Pre-clinical:**
Refers to the testing of experimental drugs in the test tube or in animals - the testing that occurs before trials in humans may be carried out. (http://clinicaltrials.gov, January 2011)

**Phase I:**
Initial studies to determine the metabolism and pharmacologic actions of drugs in humans, the side effects associated with increasing doses, and to gain early evidence of effectiveness; may include healthy participants and/or patients. (http://clinicaltrials.gov, January 2011)

**Phase II:**
Controlled clinical studies conducted to evaluate the effectiveness of the drug for a particular indication or indications in patients with the disease or condition under study and to determine the common short-term side effects and risks. (http://clinicaltrials.gov, January 2011)

**Phase III:**
Expanded controlled and uncontrolled trials after preliminary evidence suggesting effectiveness of the drug has been obtained, and are intended to gather additional information to evaluate the overall benefit-risk relationship of the drug and provide adequate basis for physician labeling. (http://clinicaltrials.gov, January 2011)
Financial terms (1/2)

IPO:
“Initial public offering: the first sale to the public of shares in a company, leading to a stock market listing (flotation).” (Financial Times Lexicon)

In/out licensing:
“Receiving/granting permission from/to another company or institution to use a brand name, patent, or other proprietary right, in exchange for a fee or royalty.” (Galapagos, Annual Report 2009)

Venture Capital:
“Private equity or institutional funding for start-up companies considered to have strong growth prospects. There can be several phases of investment (see seed money), through to the stage when the company is able to go public. Venture capital firms may also provide management assistance and other services. This is equity or quasi equity funding provided by professional investors to young, high growth oriented companies, typically to finance their early market development and growth. As well as funding, investors usually provide value-added services. Funding is often provided in stages, providing sufficient cash to reach the next milestone.” (Financial Times Lexicon)
Note that this can refer to both non-listed and listed companies.

Private equity:
“Injection of funds by specialised investors into private companies with the aim of achieving high rates of return. This is equity or quasi equity funding provided by professional investors to mature private companies with the aim of gaining a financial return through interests, dividends and capital gain at exit.” (Financial Times Lexicon)

Milestone payment:
Payment related to a major achievement in a project or program; In the context of biotech companies, this can be a milestone in the drug development process, but also the first commercial sale, which requires approval and reimbursement by payers.

Example:
GSK and Prosensa started an “exclusive worldwide collaboration for the development and commercialisation of RNA based therapeutics for Duchenne Muscular Dystrophy (DMD).” “The financial terms include a GBP £16 million (USD $25 million) upfront payment. Furthermore, Prosensa is eligible to receive up to GBP £412 million (USD $655 million) in milestones payments if all four compounds are successfully developed and is also entitled to double-digit royalties on product sales (Oct 2009, www.gsk.com).
Prosensa “received a £7.5m milestone payment from GlaxoSmithKline (GSK) as a result of achieving a data milestone in its Phase Ila open label extension trial of GSK2402968 (PRO051), being developed to treat Duchenne Muscular Dystrophy (DMD) under its agreement with GSK. The milestone payment was based upon achievement of a successful safety review, with no serious safety signals observed.” (Oct 2010, www.prosensa.eu)
Alliance
“An agreement between two or more organizations to work together. If two or more organizations are in alliance with each other, they work together.” (Financial Times Lexicon)

Angel investor
“A wealthy individual who invests in a start-up company with his or her own money. Also known as business angel, the individual provides equity or quasi equity funding to growth oriented private companies with the aim of achieving a financial return through capital gain at exit. As well as money, they also provide value-added services.” (Financial Times Lexicon)

Buyout
Buyout refers to a situation where the existing owners of a firm are "bought out" by another group, usually management and/or workers of that firm. A buyout may be for the whole firm or a division or plant as the case applies. (OECD, Glossary of Statistical Terms)

Management buyout
Management Buy-out or MBO is the term used for the funds provided to enable operating management to acquire a product line or business, which may be at any stage of development, from either a public or private company.

Leveraged buyout
Leveraged buyout is defined as the purchase of a company or a controlling interest of a corporation's shares or product line or some business. A leveraged buyout is accomplished with borrowed money or by issuing more stock.

Debt financing
“Debt financing means when a firm raises money for working capital or capital expenditures by selling bonds, bills, or notes to individual and/or institutional investors. In return for lending the money, the individuals or institutions become creditors and receive a promise to repay principal and interest on the debt.” (FundingPost.com, Venture Capital Glossary)

PIPE
“PIPE or Private Investment in Public Equity is a term used when a private investment or mutual fund buys common stock for a company at a discount to the current market value per share.” (FundingPost.com, Venture Capital Glossary)
Appendix F – Consulted experts and organizations
The help and insights of many cluster experts were essential in realizing the Dutch Life Sciences Outlook 2012.

<table>
<thead>
<tr>
<th>First name</th>
<th>Last name</th>
<th>Position</th>
<th>Company / Institute</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maria</td>
<td>Aguirre¹</td>
<td>Director</td>
<td>BioBasque Agency (SPRI)</td>
<td>Spain (Basque Region)</td>
</tr>
<tr>
<td>Nic</td>
<td>Alexakis³</td>
<td>CEO</td>
<td>Swiss Biotech Association</td>
<td>Switzerland</td>
</tr>
<tr>
<td>Bas</td>
<td>Allart³</td>
<td>-</td>
<td>Universiteit Utrecht</td>
<td>The Netherlands</td>
</tr>
<tr>
<td>Nerea</td>
<td>Alonso¹</td>
<td>General scientific contact, local responsible</td>
<td>Biocat</td>
<td>Spain (Catalonia)</td>
</tr>
<tr>
<td>Pytrik</td>
<td>Altena³</td>
<td>Advisor Innovation, Intelligence and Coordination</td>
<td>Agentschap NL</td>
<td>The Netherlands</td>
</tr>
<tr>
<td>Frank</td>
<td>Baaijens⁴</td>
<td>Scientific Director</td>
<td>BMM</td>
<td>The Netherlands</td>
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<tr>
<td>Soroya</td>
<td>Beacher⁴</td>
<td>Chair</td>
<td>OSCAR</td>
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<tr>
<td>Michel</td>
<td>Bergh²</td>
<td>Director</td>
<td>TTO Erasmus MC</td>
<td>The Netherlands</td>
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<tr>
<td>Peter</td>
<td>Bertens⁴</td>
<td>Senior Policy Advisor</td>
<td>Nefarma</td>
<td>The Netherlands</td>
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<tr>
<td>Peter</td>
<td>Biedermann³</td>
<td>Cluster Manager</td>
<td>Swiss Medical Cluster</td>
<td>Switzerland</td>
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<tr>
<td>Chantal</td>
<td>Blok³</td>
<td>Business Development Manager</td>
<td>A-skin</td>
<td>The Netherlands</td>
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<tr>
<td>Graeme</td>
<td>Boyle¹</td>
<td>Director</td>
<td>Nexxus</td>
<td>Scotland</td>
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<tr>
<td>Mariana</td>
<td>Brandão¹</td>
<td>Director Finance and Human Resources</td>
<td>Biocant</td>
<td>Portugal (Portuguese science park)</td>
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<td>Bjorgunn</td>
<td>Bretti³</td>
<td>-</td>
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<td>The Netherlands</td>
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<td>Buijs³</td>
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<td>BioMedbooster</td>
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<td>Nettie</td>
<td>Buitelaar³,⁴</td>
<td>Managing Director</td>
<td>Leiden Bio Science Park</td>
<td>The Netherlands</td>
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<tr>
<td>Juan</td>
<td>Carmona-Schneider¹</td>
<td>Senior Consultant</td>
<td>ZENIT GmbH</td>
<td>Germany (Ruhr Area)</td>
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<td>Hans</td>
<td>Clevers⁴</td>
<td>Director</td>
<td>Hubrecht Institute</td>
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<td>Fabrizio</td>
<td>Conicella¹</td>
<td>General Manager</td>
<td>bioPMed cluster</td>
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¹Participants in the Cluster Assessment meeting organized by the Council of European BioRegions (CEBR) on November 29, 2010
²Dedicated interviews on the creation of the Life Sciences Outlook 2011
³Consulted for data on the performance and progress of the Dutch and key international clusters.
⁴Participants in the workgroups dedicated to the recommendations formulated in the Outlook 2010.
### Consulted experts (2/6)

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<td>Erica</td>
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<td>Sergiy</td>
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