Smooth Sailing for STEVIN

P. Spyns[1,2], E. D'Halleweyn[1]
[1] Nederlandse Taalunie
Lange Voorhout 19, 2514 EB Den Haag, Nederland
{pspyns, edhalleweyn}@taalunie.org; http://taalunieversum.org
[2] Vlaamse overheid, Departement Economie, Wetenschap en Innovatie
Koning Albert II-laan 35, bus 10, 1030 Brussel, België

Abstract

In this paper we report on the past evaluation of the joint Flemish-Dutch STEVIN programme in the field of HLT for Dutch (HLTD). STEVIN was a 11.4 M euro programme on HLT for Dutch that was jointly organised and financed by the Flemish and Dutch governments. The aim was to provide academia and industry with basic building blocks for a linguistic infrastructure for the Dutch language. An independent evaluation has been carried out. The evaluators concluded that the most important targets of the STEVIN programme have been achieved to a very high extent. In this paper, we summarise the context, the resulting resources and the highlights of the STEVIN final evaluation.

Keywords: research programme evaluation, STEVIN, human language technology for Dutch policy

1. Introduction

Languages do not confine themselves inside the boundaries of a (single) state. Some countries and regions that share a language have created joint organisations or platforms to strengthen the position of their shared language. In 1980 the Belgian[1] and Dutch governments signed a treaty to cooperate in promoting the Dutch language and created the Dutch Language Union (Nederlandse Taalunie - NTU).[2] They gave up a part of their autonomy and decided to conduct – to a certain degree – a joint language policy. This unique kind of cooperation has many advantages: duplication of efforts can be avoided, expertise can be shared and funds pooled.

In the last decade, the NTU has taken a serious interest in digital language resources and human language technologies (HLT), because they are crucial for a language to be able to survive in the information society. In 1999, the Dutch and Flemish governments decided to collaborate on HLT for Dutch and set up an HLT Platform. The HLT Platform organised a number of activities, which eventually resulted in a stimulation programme for HLT for the Dutch language (Cucchiarini & D'Halleweyn 2004). This programme, called STEVIN[3], has already been described during previous LREC conferences (D'Halleweyn et al. 2006, Spyns et al. 2008, Spyns & D'Halleweyn 2010).

In this paper we report on the past final evaluation of the joint Flemish-Dutch STEVIN-programme. In section 2, we shortly recall the organisational structure of STEVIN and give a short overview of the main activities. Subsequently, the evaluation set-up and methodology are presented (section 3). Recommendations by the external evaluator are listed in section 4, while section 5 briefly sums up the materials resulting from the STEVIN programme. In section 6, the impact of STEVIN is discussed. The paper ends with an outlook (section 7) and conclusion (section 8).

2. STEVIN organisation

The STEVIN programme was jointly financed by the Flemish government – Department of Economy, Science and Innovation (EWI), Agency for Innovation by Science and Technology (IWT) and the Research Foundation Flanders (FWO) – and Dutch government – Ministry of Education, Culture and Science (OCW), Ministry of Economy, Agriculture and Innovation (ELI) and the Netherlands Organisation for Scientific Research (NWO). The Dutch partners were responsible for two thirds of the budget and the Flemish partners for one third. It amounted to 11.4 million Euros and ran from late 2004 till mid 2012.

The programme was coordinated by the Dutch Language Union and supervised by a board of representatives of the funding bodies (HLT Board). A programme committee, including both academic and industrial representatives, was responsible for scientific and content-related issues. A programme office, a joint collaboration of The Netherlands Organisation for Scientific Research and Agency NL – NL Innovation, took care of operational matters.

Figure 1 shows what is called the "intervention logic" of the STEVIN programme, i.e. how the STEVIN high level mission statements were translated into concrete targets that are realised by means of specific activities. During the STEVIN programme, the main activities comprised the organisation of calls for project proposals:

- Three open calls for research and development projects in 2004, 2005 and 2007;

[1] As a consequence of the Belgian state reform (federalisation), Flanders later became the official partner of the treaty.
[2] In 2004 Surinam joined the Nederlandse Taalunie as an associated member.
[3] STEVIN stands for 'Essential Speech and Language Technology Resources'. In addition, Simon Stevin was a 17th century applied scientist who, amongst other things, introduced Dutch terms for mathematics and physics concepts. He worked both in Flanders and the Netherlands. Hence, his name is a perfect acronym for this joint programme. And he became famous for building a land yacht for Prince Maurice of Orange who sailed with it on the beach of Scheveningen – cf. http://en.wikipedia.org/wiki/File:Simon_Stevins_zeilwagen_voor_Prins_Maurits_1649.jpg.

- Two calls for tender in 2005 en 2007;
- Three calls for demonstration projects in 2005, 2006 en 2007;
- Three calls for educational projects in 2007, 2008 en 2009;
- Two calls for master classes in 2008 en 2009.
- In addition, several supporting activities were organised, a.o. networking meetings, conferences, industry days (Language@Work), STEVIN days, and other public events.

STEVIN has awarded 19 R&D projects (in total 8.909 K euros), 14 demonstrator projects (1011 K euros), 3 educational projects (100 K euros), 2 master classes (33K euros) and 31 networking grants (45K euros in total). The acceptance rate for the R&D projects was between 26% and 33%. In the Low Countries, most of the funding agencies consider an acceptance rate of around 30% sufficiently selective to guarantee scientific excellence and high enough to fund (almost) all the best proposals.

3. Evaluating STEVIN

It is a good standard policy practice to try to determine, at the end of a research programme, if and how the pre-set objectives and targets have been reached. An evaluation is not only performed to check and justify that funding was well spent but also with the explicit aim to learn and improve matters for the future.

3.1 Practical organisation

In order to have an independent and objective evaluation, the NTU, as programme coordinator, proposed a method to organise and monitor the evaluation process, which was approved by the HLT Board. It included a specific steering group with two representatives of the funding bodies and a member of the NTU who together drafted the evaluation assignment and issued a public procurement call.

The Technopolis Group [4] was selected by the steering group (out of three candidates) to perform the evaluation. The steering group subsequently monitored the progress of the Technopolis Group and eventually approved the final version of the evaluation report. Note that the members of the evaluation steering group did not participate directly in the STEVIN daily operations and were only remotely familiar with the programme. This was a prerequisite to maintain an objective and neutral view.

3.2 Assignment

Evaluating a research programme is a complex endeavour as many different aspects are involved.[5] To avoid an ad hoc approach, the structure and content of the STEVIN evaluation assignment was largely based on standard evaluation practices and methods as applied by the Flemish EWI department.[6] Not only the scientific issues but also the governance and economic aspects of the programme had be taken into account. The main aspects of the STEVIN programme to be evaluated were its:

- general way of operating including:
  - organisational aspects;
  - scientific performance;
  - impact and dissemination towards the scientific field and other societal groups and the knowledge transfer towards industry.
- customer or stakeholder satisfaction.

A large number of evaluation questions were included in the assignment. These questions concerned four main topics and are listed below:

- *Efficiency*: Were the resources properly and adequately used? Has STEVIN reached the pre-set goals in an acceptable/efficient manner? Was the management of the programme efficient? And how (adequately) was the monitoring of the programme progress done?
- *Effectiveness*: Did the programme reach the stated objectives? Which activities or objectives did not materialise, and why? Was the programme effectively organised? and has the programme (positively) influenced the policy agenda in Flanders and The Netherlands?
- *Usefulness*: Were the problems in the HLT domain identified at the start of the programme successfully addressed? Which and why not – if applicable ? What is the difference compared to an earlier SWOT-analysis? Was there an overlap with other activities / efforts? and what was the role of STEVIN within the HLT domain, both nationally and internationally?
- *Relevance*: To what extent did STEVIN lead to usable material for the HLT field and user groups? Did the calls for project proposals reach the appropriate target groups? To what extent has the technological and scientific progress in the HLT field evolved thanks to STEVIN? and what was/is the added value of STEVIN? Is there any clearly identifiable improvement in the digital linguistic infrastructure for Dutch ?

Additionally, a number of more detailed evaluation questions have been formulated that concern specific issues of STEVIN. E.g., what is the percentage of overhead? What are the strong and weak points of the STEVIN governance structure? Did the project evaluation procedures happen in a fair and transparent way? Did conflicts of interest occur? What was the quality of the scientific output (impact of publications)? Did industry benefit from STEVIN results? All these questions that concern the different processes of the STEVIN-programme were grouped around the following topics:

- Governance and management of the programme;
- Application and selection process;
- Effects and impacts of the programme;

[4] http://www.technopolis-group.com

[5] Note that we can obviously only give a partial account and summary of the evaluation due to space restrictions.

[6] Of course, this was validated, adapted and approved by the entire evaluation steering group and the HLT Board subsequently.

- Positioning of the programme with respect to other programmes;
- Future of the programme.

3.3 Method

The Technopolis Group, which was awarded the evaluation assignment, combined both quantitative and qualitative research methods (Deuten et al., 2010).

During a first phase of desk research, all the relevant documents (meeting minutes of the various committees and working groups, calls for proposals, financial reports, STEVIN multi-annual working plan, yearly work plans and activity reports, etc.) were collected and analysed – in particular, the report on the base line situation (= state of the HLT field in Flanders and the Netherlands shortly after the start of STEVIN cf. (Akkermans et al., 2007)). Four international HLT experts[7] were asked to examine the STEVIN scientific output. Also, some documentation on other international programmes was analysed. An international benchmark study allowed for comparing the STEVIN programme to other (multi-)national R&D programmes.

Subsequently, two online surveys were sent to the participants of the programme and other HLT related organisations in Flanders and the Netherlands. In total, 127 relevant contacts were invited to participate. The first survey addressed academics in Flanders and the Netherlands, c.q. successful and unsuccessful submitters of STEVIN proposals. Research institutes that had participated in the baseline survey, even those institutes that did not participate in STEVIN, were also invited. 62 research institutes were contacted, of which 56.5% responded. The second survey concerned the Flemish and Dutch HLT industry. Again, applicants for funding (granted or not) were invited as well as companies that had participated in the baseline survey. 65 companies were contacted with a response rate of 43.2%. The responses may thus safely be assumed to be representative (overall response rate of 49.6%).

In a third stage, telephone interviews were held with submitters whose proposal was not accepted. Additionally, some 20 face to face interviews and talks with a large variety of people involved in STEVIN (the programme coordinator, members of programme office, of the programme committee, of the HLT Board, project participants …) took place.

Finally, the state of the HLT field in the Low Countries was examined and compared to the base line study done shortly after the start of STEVIN (cf. Akkermans et al., 2007). A network analysis was included to map the relations between the various HLT organisations in Flanders and the Netherlands participating in STEVIN.

[7] Annie Zaenen (Stanford University / PARC), Joseph Mariani (LIMSI-CNRS), Justus Roux (North West University – Potchefstroom) and Werner Verhelst (Vrije Universiteit Brussel – ETRO).

4. Recommendations

One of the purposes of the evaluation was to learn how a similar programme should be organised in the future. Therefore, providing recommendations was explicitly a part of the job for the external evaluator. Based on the desk research and interviews, the Technopolis Group presented the following ten recommendations[8]:

1. The integrated approach of STEVIN was a good method and should be replicated in a potential follow-up of STEVIN. The focus should then be shifted from the digital language infrastructure and strategic research to application-oriented research and demonstration projects. In the design of the programme, multiple modalities should be possible: basic research combined with more application-oriented research and projects aimed at either strategic or application-oriented research. Maybe less of a priority, but still important are projects aimed at basic language infrastructure.
2. STEVIN is an example of transnational cooperation through "joint programming" that has value for both funding parties and performers. A possible follow-up to STEVIN should also have a bilateral structure with a "common pot".
3. The main structure of governance does not need to be adjusted. However, the tasks and responsibilities should be defined more precisely, so that it is clear to everyone what the tasks and roles of the various organisations involved are.
4. The programme office needs to be positioned more closely to the NTU. This could be done by means of a secondment to the NTU from the various organisations involved.
5. The programme office should also be more balanced, in the sense that there should be better Dutch-Flemish balance in the governance structure.
6. In general, partly dependent on the focus of a follow-up programme, the composition of different committees and commissions should be reviewed. If its focus is to be more on the application of HLT-knowledge in practice, representation of industry and applicators should be enforced.
7. Prior to a follow-up to STEVIN, the rules regarding IPR should be clearly defined and availability of standard contracts, et cetera should also be taken into consideration. The role of open source and an inventory of required actions are important aspects in this. The preparations can build on the work of the STEVIN IPR Working Group and the experiences of the HLT Agency.
8. A more active collaboration with related programmes at the national level, and at European level is needed in the follow-up programme. In addition, potential links with social innovation programmes in the fields of education, care, and safety should be investigated.
9. If strategic research plays an important role in a follow-up programme, more publications in international journals and at international summits

[8] The recommendations have been copied, translated and pasted without any other modification in order not to introduce other interpretations than those intended by the Technopolis Group.

are expected.

10. Consider dedicating part of the budget to an international publication in which the results of the STEVIN programme are presented in conjunction.

5. Achievements

The two main goals of the STEVIN programme were to contribute to the further progress of HLT for Dutch in Flanders and the Netherlands and to stimulate innovation in this sector. In addition, STEVIN had to strengthen the economic and cultural position of the Dutch language in the modern ICT-based society (cf. Figure 1). Two important targets, or ways to realise the two goals mentioned above, were the creation of an adequate digital infrastructure for Dutch (target 1 on Figure 1) and the support of strategic research (target 2 on Figure 1). Achieving both targets was the rationale to organise calls for and evaluation rounds of R&D project proposals and to subsequently fund and monitor accepted projects. Hence, to show to which extent the targets have been reached, we briefly sum up in this section the most important resources and tools resulting from the STEVIN R&D projects. We refer the reader to the book on STEVIN (Spyns and Odijk, 2012) for more details on each project. If not explicitly mentioned otherwise, all resources and tools listed below apply to Dutch.

1. Autonomata and Autonomata Too:
   - A transcription toolset to enrich names (proper names, street names, brand names, POIs, …) with detailed transcriptions
   - A spoken name corpus of 5,000 different names consisting of utterances of 60 native Dutch, 60 native Flemish and 120 non native Dutch/Flemish speakers
   - A speech recognition demonstrator for POIs
   - A point of interest (POI) corpus (16,000 sound files, 80 speakers, POIs from Belgium and the Netherlands)
2. Corea:
   - A coreference resolution module
   - A corpus annotated with co-reference relations of over 200,000 words
   - Guidelines for co-reference annotations
3. D-Coi & SoNaR:
   - Corpus cleaning procedures and design guidelines
   - Annotation schemes
   - A reference corpus of contemporary written Dutch: more than 500 million words annotated automatically with PoS and lemmatised.
   - A one million word subset is semantically annotated (NE, co-reference, semantic roles and space-time expressions)
   - A corpus acquisition manual
4. Irme:
   - Multiword expression identification software
   - A lexical database (with a web interface) of 5,000 Dutch multiword expressions
5. Jasmin-CGN:
   - An annotated corpus of 115 hours of utterances by children, non-natives and elderly
6. Daeso:
   - Tools for automatic alignment and classification of semantic relations
   - A sentence fusion module
   - A multidocument summariser
   - An annotated (including semantic relations) monolingual Dutch parallel corpus of more than one million words
7. DPC:
   - A parallel corpus (of 10 million words) that is sentence aligned and bidirectional (Dutch, French and English with Dutch as pivotal language)
   - A web based parallel corpus concordancer
8. Lassy:
   - A one million word corpus syntactically annotated (treebank) manually verified and corrected
   - A 1.5 million word corpus annotated automatically (PoS, lemma, dependency information)
   - Various tools for corpus browsing, searching and manipulating syntactic dependency structures
9. Midas:
   - Noise robustness module consisting of several missing data detectors for a speech recogniser
10. N-best:
    - Evaluation plan and protocol for speech recognisers
    - Training data, evaluation data
    - Scoring and preprocessing tools
11. STEVINcanPRAAT:
    - A vowel editor and Klatt synthesiser for the SPRAAK open source package
12. Spraak:
    - A speech recognition research toolkit
13. Cornetto:
    - A semantic database with meanings of 92,000 Dutch words (around 70, 000 concepts) defined by structural lexical semantics relations
14. Daisy:
    - A web based demonstrator of a summariser for Dutch texts
    - A text generation tool
    - Tools that segment and classify the content of web pages according to rhetorical roles
15. Disco:
    - a computer aided language learning application prototype for Dutch as a second language
16. Duoman:
    - Sentiment lexica and data (including blog material)
    - A web demonstrator (with various novel IE/IR and classification algorithms)
    - Test sets to classify and evaluate sentiment extraction
    - Tools to extract sentiment relations
17. Paco-MT:
    - A prototype of a hybrid (statistics and rule based) translation engine
    - Language generation modules
    - Tree node alignment tools

Almost all the resources and tools listed above are available via the one stop shop for HLT for Dutch materials, called the HLT Agency (van Veenendaal et al.,

2010)[9]. Due to space limitations, we cannot discuss in detail for every project (result) its contribution to the goal of realising a digital infrastructure for Dutch. In general, according to the Technopolis Group, the programme has achieved its objectives by resolving many of the major bottlenecks defined earlier in the BLARK for Dutch priorities (Daelemans et al., 2005).

6. Impact

6.1 Methodological reflections

Funding organisations not only want to know if the funding money has been adequately used, but also like to know the impact of the funding. Basically, the two main questions are whether or not the funding was wasted (efficiency) and whether or not the starting situation did improve thanks to the funding money (effectiveness). For the latter aspect, several indicators, related to the targets of an R&D programme, can be used. E.g., rather straightforward performance indicators, such as the number of (high impact) papers published (for research institutes), or the amount of new products of services created (for companies). More complex and difficult to attribute to a specific programme are longer term effects on society (e.g., has the Dutch language been able to reinforce its position in modern ICT and knowledge based society ?). In this section, we report on how the HLT sector in the Low Countries assessed the effects of the STEVIN programme.

From a methodological point of view, the effectiveness can only be established in a valid manner if counter factual data is available (comparison to a base line, availability of comparable control data) and care is taken to avoid biases (cf. Spyns and D'Halleweyn, 2010). Unfortunately, even though for STEVIN a base line study had been done, it proved to be not feasible (within the boundaries of the evaluation assignment) to define a valid control group of organisations (companies or research organisations that did not receive funding by STEVIN and that can be compared to ones that benefited from STEVIN funding) to compare with. Hence, the impact of STEVIN was examined on the basis of factual performance data[10], interviews with and surveys of participants and stakeholders (including a self assessment report by the STEVIN programme committee)[11].

6.2 Outcomes

In this section, we report on the impact of STEVIN on organisations in the HLT field, in particular the effect of their participation. The data to draw conclusions from were obtained through surveys – cf. section 3.3.

The most important expectations from academia (publishing and performing new research – cf. Figure 2) were not that well met with. This follows directly from the main aim of STEVIN, namely to build a digital language infrastructure for Dutch, which does not imply performing cutting edge research – rather the contrary. Nevertheless, already during the midterm review, and again during this final review, the reviewers pointed out that more (high impact) scientific publications would fit the size of the STEVIN programme. [12] The expectation by academia that has been fulfilled to the highest degree is the creation and maintenance of a (knowledge) network with other research groups. But creating spin-offs was clearly no concern. Also, the hope of receiving government funding and developing essential language resources has largely been fulfilled. The latter is the third most important expectation and the second best one realised.

Companies evidently considered other opportunities than academia (cf. Figure 3). Acquiring new knowledge and technologies was the most important reason for an enterprise to participate in the STEVIN programme. This wish was moderately satisfied. The second expectation, reducing the risks of R&D – very probably thanks to government funding – was realised to the second highest degree. The expectation that was fulfilled in the highest degree was the hope to acquire new contacts in the academic field. Recruiting researchers apparently was not an issue. Other effects on companies were better opportunities for innovation, improved products, processes and services, and acceleration of the innovation process. Around 60% of the companies stated that the participation in STEVIN resulted in new applications for HLT modules.

The statements above show that the STEVIN programme largely lived up to the expectations. In particular, the creation of basic linguistic resources for Dutch and the reinforcement of contacts between HLT players (from academia, from industry, from Flanders, from the Netherlands). All in all, from the surveys the Technopolis Group concluded that many respondents felt that STEVIN had a major impact on the field. The large majority qualified STEVIN as 'important' to 'very important'.

7. Outlook

It remains a very hard challenge to align different governmental organisations on both sides of the border to set up new joint activities in the field of HLTD as each has its own traditions, policy cycles and policy priorities. Traditionally in Flanders, specific thematic R&D programmes are rare but proposals on any topic can be submitted (a "bottom up" approach), while the Netherlands organise specific programmes addressing specific topics and priorities (programmatic approach). It means that to organise a jointly funded programme, existing frameworks must be "bended" and tweaked, which requires extensive concertation and preparation amongst the funding organisations.

[9] http://www.inl.nl/tst-centrale

[10] http://www.stevin-tst.org/documenten/stevin_fact_file2.pdf

[11] http://www.stevin-tst.org/documenten/stevin_final_self_assessment.pdf

[12] In all fairness, it should be mentioned that around 55 new papers appeared after the delivery of the final evaluation report. In total, around 200 official STEVIN papers were published (see www.stevin-tst.org/publicaties.php). The distribution of publications over the projects shows that the application oriented projects resulted in more higher impact publications than the resource producing projects.

In addition, assessing and "proving" the economic value of HLTD research remains a difficult task as HLT is mainly an enabling industry scattered over many different applications and addressing various societal challenges. In addition, the current difficult financial circumstances are not very helpful as both Flemish and Dutch governments have to economise on their overall budget, and implement different strategies to achieve this. Flanders chose to reduce its science and innovation budget in a more linear way, while The Netherlands preferred to concentrate their science funding efforts on what are called "top sectors" and replace innovation subsidies by general tax measures.

As an unfortunate consequence, no direct successor programme for STEVIN can be organised. Consequently, the recommendations (cf. section 4) became less relevant. Nevertheless, the first recommendation, to pay attention to the valorisation and utilisation of the STEVIN results, can also be applied through national funding instruments and initiatives. E.g., in Flanders, the public broadcasting organisation (VRT) has started a project to improve its subtitling process by means of HLT. This project is supported by funds for Innovative Procurement, managed by the IWT (the Flemish innovation agency). Recommendation 10, an international publication, has been adopted even before the end of STEVIN, resulting in a book on the STEVIN programme (Spyns & Odijk, 2012) with scientific contributions. And another, more modest booklet, contains a short description of all STEVIN results[13].

Also, the joint Flemish-Dutch activities in the framework of CLARIN (called CLARIN-VL-NL with the TTNWW project[14] in particular) will stop at the end of September 2012. This means that after many years of successful collaboration no large scale joint HLT R&D programme by Flanders and the Netherlands remains. Regular initiatives by the local funding agencies (e.g., NWO, IWT), which allow for cross-border cooperation to a certain extent, continue but without a specific focus on HLT. In the future, HTL funding activities are probably best "embedded" in other (thematically broader) funding initiatives. HTL now has the status of an enabling technology, rather than a "standalone" technology that justifies a dedicated R&D programme.

A potentially promising avenue for new cooperation is offered by one of the Dutch "top sectors", c.q. the creative industry that also involves digital cultural and scientific heritage. Also in Flanders, these topics generate considerable interest. Another opportunity is the recently founded CLARIN-ERIC. This is a legal (permanent) intergovernmental organisation that has to manage, maintain and exploit the research infrastructure of the CLARIN network (Váradi et al., 2008). The members of the CLARIN-ERIC (who represent the national funding agencies or ministries) determine how the infrastructure will function in terms of services, cost models, access policy, etc. The Netherlands, as coordinator, clearly take the lead, while Flanders currently adopts a low profile (participation via the NTU – cf. (Spyns & D'Halleweyn 2012)).

The NTU still considers it part of its mission to keep the topic of HLTD on the agenda of various funding organisations in Flanders and the Netherlands and find common interests that ask for a joint approach. Therefore, the NTU will continue to host the HLT Platform[15] as an information exchange platform for the policy organisations involved in the funding of HLT. Keeping each other informed of new initiatives can be inspirational and may eventually lead, again, to aligning activities, and, why not, possibly to new jointly funded activities. Another task of the HLT Platform could be to supervise how the STEVIN results are managed by the HLT Agency, put to use for the benefit of academia and industry, and related to European initiatives such as CLARIN, META-net and LT-Compass[16].

8. Conclusions

The STEVIN programme has succeeded in bringing academia, industry and policy organisations in Flanders and the Netherlands closer together as well as in realising many of the goals defined at the start of the programme. The overall comments by the evaluators were very positive: the Technopolis Group concluded that the joint effort of both governments resulted in less government spending, a higher quality of research results, less duplicated efforts and a maximal efficiency in expertise and resource allocation. In a reaction, the members of the HLT Board warmly supported the conclusions by the Technopolis Group. They were happy with the quality of the evaluation report, though they missed a deeper analysis and stronger assessment at some points.

Due to the circumstances it, unfortunately, seems impossible to organise a successor programme. Nevertheless, the NTU will continue its efforts to align the science and innovation policies of Flanders and the Netherlands regarding HLT for Dutch. The CLARIN-ERIC and the interest in both territories for the creative industry and digital heritage offer two important opportunities.

9. Acknowledgments

We want to thank Els Vermander (Flemish Department of Economy, Science and Innovation), Harry Vermeer (Agency NL – NL Innovation), the collaborators of the Technopolis Group involved in the STEVIN evaluation as well as all other persons involved in the STEVIN programme for their committed collaboration.
The STEVIN programme is funded by the Flemish (EWI, IWT, FWO) and Dutch governments (OCW, ELI, NWO) (www.stevin-tst.org).

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[13] http://www.stevin-tst.org/english/

[14] Language and Speech Technology Tools for Dutch as Web services in a Workflow

[15] The HLT steering board, with the end of STEVIN, drew its supervising tasks to a close, and continues as the HLT Platform.

[16] http://www.ltcompass.eu/

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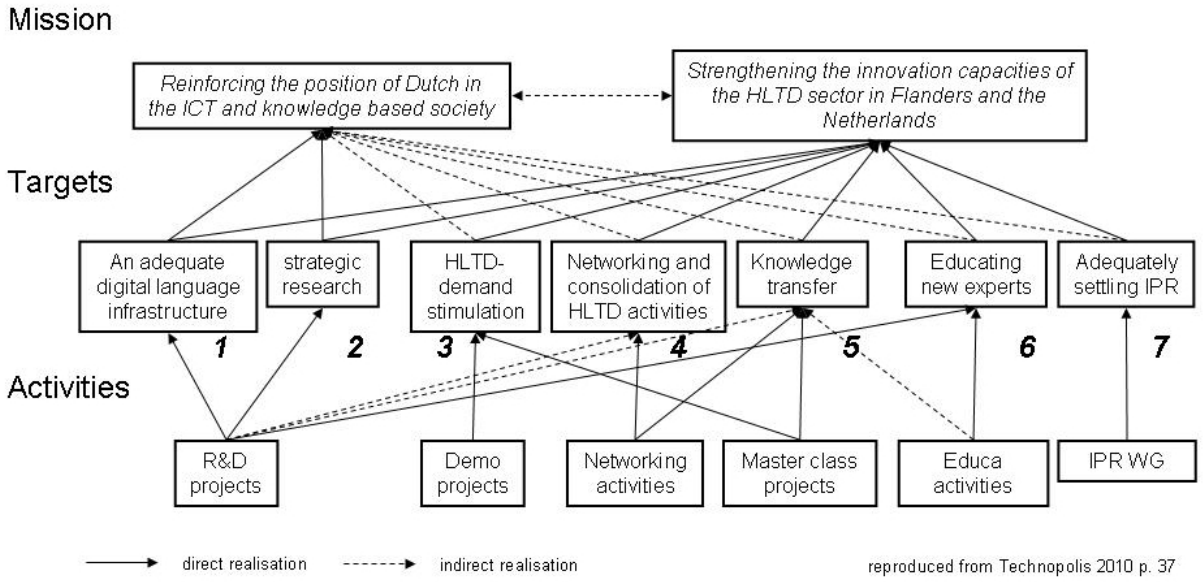

Figure 1: intervention logic of the STEVIN programme [reproduced from (Deuten et al. 2010)]

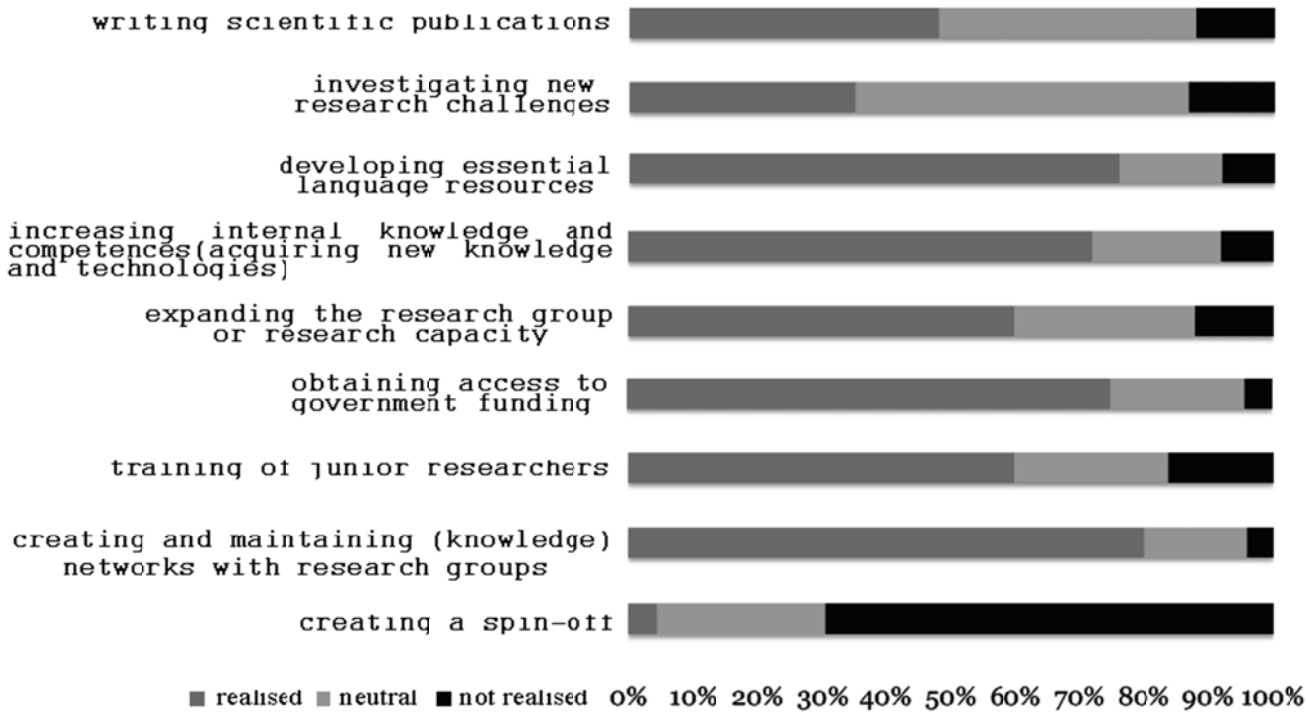

Figure 2: extent with which STEVIN has fulfilled expectations of participating HLT knowledge institutes (n = 25; highest resp. lowest expectation on top resp. bottom – adapted from Deuten et al., 2010, p. 88)

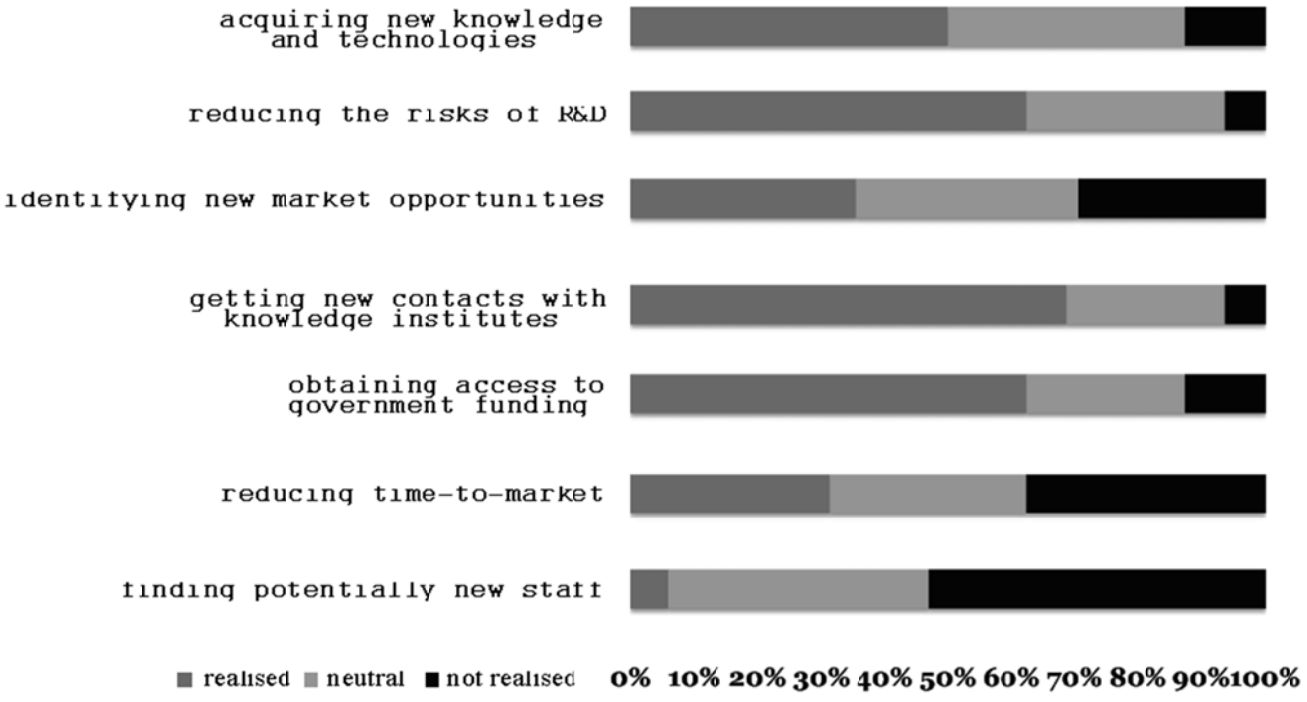

Figure 3: extent with which STEVIN has fulfilled expectations of participating HLT companies (n = 17; highest resp. lowest expectation on top resp. bottom – adapted from Deuten et al., 2010, p. 89)