securPharm

status report 2015

About securPharm e.V.

securPharm e.V. is an initiative to protect patients from falsified pharmaceuticals in Germany's legal supply chain. It is sponsored by a consortium of the following pharmaceutical companies', wholesalers' and pharmacists' associations: BAH, BPI, vfa, PHAGRO, and ABDA.

Since 2011, securPharm e. V. has been developing a protective system from falsified medicines in compliance with the requirements of the EU Falsified Medicines Directive 2011/62/EU. This system has been tested in practice since 2013. The findings derived from testing are directly used in further system development. This unique collaboration of all stakeholders in the pharmaceutical supply chain makes it possible to optimally tailor the system to the business processes of all parties involved from the outset. One important element of securPharm is the use of separate databases for manufacturers and pharmacists in order to maintain the greatest possible data privacy for patients. Today, securPharm is the leading system in Europe for the implementation of future legal requirements regarding the authenticity verification of pharmaceuticals. It is the objective of securPharm to provide a system that can be used by all market participants when the Falsified Medicines Directive becomes effective.

1. Introduction

With Directive 2011/62/EU, the so-called Falsified Medicines Directive, the European Union has defined principles for preventing falsified medicinal products from entering the legal supply chain. These principles pertain to the verification of pharmaceuticals at the package level and the ability to ascertain their integrity. Through so-called delegated acts, the EU Commission will provide essential details on the design of the Directive, likely by the end of 2015 to become effective three years after publication. With the securPharm project, the stakeholder associations of the legal supply chain ABDA, BAH, BPI, PHAGRO and vfa intend to establish the German national verification system and demonstrate how the verification requirements can be implemented in an efficient, industry- and pharmacy-friendly manner that is also viable for all parties involved in the pharmaceutical market.

1.1 Project context and limits

The securPharm project operates under real-life conditions of the German pharmaceutical market. This takes into account the diversity of pharmaceutical companies, pharmacy software and pharmacy supplier/distributor relationships. In accordance with this philosophy, there is no directed distribution of the "securPharm products" to the participating pharmacies. While this constituted an additional challenge, especially at the start of the project, it will generate more meaningful results based on more practice-oriented implementation.

Due to the positive response by pharmaceutical companies and their willingness to serialise products and use the printed Data Matrix

Code from now on, the associations of the pharmaceutical companies, wholesalers and pharmacies involved in the project have decided to extend the technical testing phase with an increasing number of participants until the delegated act becomes effective. This will be followed by a regular operation phase during which system fitness will be tested under real-life conditions. It is the objective of securPharm to provide a system that can be used by all market participants once the Falsified Medicines Directive is in effect.

1.2 Key factors for project success

1.2.1 Stakeholder associations

It is the task of stakeholder associations to represent the interests of their members to the political arena and the public. As a result, they take opposing positions toward each other at times. The key insight is that opposing interests are inappropriate in view of the significance of patient protection and the scope of the task at hand. What is important is to prove to both the public and the political arena that the associations can and will jointly assume responsibility for a safe pharmaceutical supply.

Upon closer scrutiny, it becomes apparent that it is not just manufacturers, wholesalers and pharmacists who are affected by the Directive but also a variety of others who are involved in the handling of pharmaceuticals. Therefore, it is necessary to describe their tasks precisely as well and to take into account their interests. In forming a stakeholder organisation to implement the Falsified Medicines Directive, the middle ground between the involvement of all stakeholders and everybody's ability to work must be found. Stakeholder associations that are not a member of this organisation must be

credibly assured that their interests will be taken into account through the establishment of appropriate working groups.

1.2.2 Sequence of steps

The sequence of steps chosen by securPharm is tried and tested:

↗ Establishment of the securPharm stakeholder organisation as a non-profit organisation;

↗ Attraction and involvement of experts;

↗ Agreement on objectives and rules as part of a "memorandum of understanding";

↗ Development of a working plan and budget;

↗ Review of the national conditions, including the

   ↗ Availability of master data (see 1.2.5);

   ↗ Availability of an internationally usable product number (see 1.2.6);

↗ Establishment of operating organisations;

↗ IT provider selection and implementation of the systems;

↗ Organisation of the collaboration with the national competent authorities.

1.2.3 Organisational structure

The founders of securPharm have decided on a four-level structure.

1. The European Parliament and the Council pass the Directive and the delegated act, thereby creating the framework to be overseen by the national competent authorities.

2. securPharm creates the prerequisites for implementing the Falsified Medicines Directive in Germany, describes the rules, organises the procedures and resolves conflicts. The latter includes that securPharm will operate a conflict management system (CMS) for documenting and settling any type of unexpected event during the verification of medicinal packs.

3. The national operators of the pharmaceutical industry database (ACS PharmaProtect) and the pharmacy system (ABDATA) commission the providers who will install and operate the required databases.

4. Arvato has already been commissioned to serve as provider for the pharmaceutical industry database.

1.2.4 Data ownership and privacy

Experience from other projects such as the electronic patient file has shown that special attention should be paid to data ownership. Based on this experience, the concerns regarding data use for other purposes than the intended one by unauthorised market partners and the knowledge that data are already being used for advertising in other EU countries, the German stakeholder associations have first addressed the issue of data ownership.

They agreed to store and manage the data of the pharmaceutical companies and those of the pharmacies in physically separate databases. As a result, data ownership is organised clearly and visibly for everybody. At the same time, this ensures the greatest possible data privacy for patients.

1.2.5 Centralised management of national master data

As early as 1967, the German stakeholder associations decided on the central management of master data for the products in demand at German pharmacies (both pharmaceuticals and non-pharmaceuticals). This was the hour of birth of today's IFA (Informationsstelle für Arzneispezialitäten). It is the organisation that assigns the classification code known as "Pharmazentralnummer" (PZN), which is without exception used by all market participants handling pharmaceuticals. The centralised assignment of the PZN guarantees its uniqueness as a classification code.

If the assignment of product identification numbers is left to the pharmaceutical companies in other countries, the uniqueness of product numbers cannot be guaranteed, at least while there are no centrally stipulated rules and the implementation of rules is not centrally monitored!

Centralised management of master data and centralised assignment of product numbers without a clear and meaningful reference to the manufacturer become very significant whenever pharmaceutical licenses are sold to other pharmaceutical companies and the party responsible for the old merchandise must subsequently be identified.

1.2.6 Use of national product numbers in an international system

Just like the PZN in Germany, national product numbers are also used in other European countries. In this respect, they represent a national standard that could only be modified at great expense to all market participants, and they may even be governed by national law. For example, the extension of the German PZN from seven to eight digits was only feasible after 10 years of discussions and a technical lead time of three years. The complete exchange of a national product number system must therefore seem futile.

A possible alternative are container systems that envelop the national product number, i.e. preserve it for national use, and provide supplementary data to guarantee international usability. Since only one system was known in the past (NTIN by GS1) and GS1 individually decides on the use of the NTIN for each user nation, securPharm commissioned IFA with the development of its own container system – the Pharmacy Product Number (PPN). Since 2013, it has been globally available free of charge and is based on ISO/IEC. Since then, its applications have been extended from printing/labeling retail packages to tagging outer packaging, pallets and shipments. It can also be used for multi-country packs and as UDI for medicinal products.

2. Coding agreement

2.1 General

In addition to the requirements laid down in the German Social Code Book V (Section 131 para. 5) for the placement of machine-readable features on the packaging of medicinal products, the stakeholders in the German pharmaceutical market involved in the securPharm project agreed on a machine-readable label for sales packages containing the following data elements:

- ↗ Product number
- ↗ Batch number
- ↗ Expiration date
- ↗ Serial number

In the context of the securPharm project, labeling will include a Data Matrix Code in accordance with ISO/IEC 16022. This ensures that these data elements are machine-readable worldwide and forms the technical prerequisite for implementing the EU Directive for the prevention of falsified medicines.

Once the delegated act becomes effective, this labeling principle will be legally mandatory.

2.2 Coding rules

The key feature is the well-established German "Pharmazentralnummer (PZN)" (central pharmaceutical number) embedded in the internationalised versions of either the Pharmacy Product Number (PPN) or the National Trade Item Number (NTIN), each of which constitutes a globally unique product number. The securPharm "coding rules" comprehensively describe the printing/labeling of pharmaceutical packages in order to ensure trouble-free machine reading and further data processing. The coding rules provide detailed descriptions of the code's content, size, print quality and much more (see also www.securpharm.de/en/mah/coding).

The symbology selected for the data container is the two-dimensional Data Matrix Code, as it has excellent characteristics regarding data density, data volume, geometric scalability and robustness. The coding rules generated by securPharm allow coding of information in compliance with the ASC format described in the IFA specification as well as the GS1 format. Both formats are in accordance with ISO/IEC 15434 and use the data designators in compliance with ISO/IEC 15418. This ensures an open market for pharmaceutical companies without additional, binding licensing fees. At the same time, the domestically established product number PZN and all associated processes are preserved.

Upon publication of the delegated act, the securPharm coding rules will be updated in terms of any details added by the EU Commission. However, any fundamental rules are not expected to change.

3. The verification process for medicinal products

The pharmaceutical manufacturer places an individual serial number on each package during the production process. This serial number, along with the product number PZN (via PPN or NTIN), batch number and expiration date, are printed in a Data Matrix Code on the package. In parallel, the manufacturer uploads these data to the central database of the pharmaceutical industry.

Each pharmaceutical company reports to IFA the pharmaceuticals that already bear the Data Matrix Code and can be verified in pharmacies (centralised management of national master data). Via ABDA information services, the pharmacy software recognises the flag from the IFA database and controls the processes at the pharmacy accordingly.

To verify the authenticity of a product package, the pharmacy staff scans the Data Matrix Code of the package before dispensing it to the patient. The serial number and product number are checked against the database of the pharmaceutical companies in the background. The package status as it is stored in the database is reported back to the pharmacy. If the status is correct, the package can be dispensed and the package status is simultaneously changed in the database to "dispensed."

Since retail packages can bear multiple codes and additional two-dimensional codes increasingly appear on packages (e.g. codes with links to URLs), the abbreviation PPN in the Data Matrix Code provides pharmacy staff with the information that this code contains the data for pharmaceutical verification and must be scanned. The PPN abbreviation stands independent of the above-mentioned "envelope" of the PZN, since the PZN is extracted for merchandise management purposes and the NTIN envelope is transferred into the PPN envelope for verification anyway.

If the data check shows that the serial number is either not found in the database or has already been dispensed, the pharmacy receives a corresponding warning, so that the necessary measures can be taken. This will prevent a non-verifiable and possibly falsified pharmaceutical from being dispensed to the patient.

Before dispensing, pharmaceutical packages can also be verified by others, such as wholesalers or at goods in process at the pharmacy. This allows the verification of authenticity in the chain of distribution even before pharmaceuticals are verified when being dispensed to the patient.

4. System structures

securPharm is based on the concept of separate databases (see image). The pharmaceutical companies upload their packaging data to the manufacturers' database. In order to maintain this centralised manufacturers' database, the associations of BAH, BPI and vfa established an operating company (ACS PharmaProtect GmbH), which is currently financed by these industry associations. Verification queries from pharmacies are collated and rendered anonymous by the centralised pharmacy server and sent to the manufacturers' database. The pharmacy server is maintained and financed by ABDATA Pharma-Daten-Service, a business unit of Werbe- und Vertriebsgesellschaft Deutscher Apotheker

mbH. Wholesalers will also process their verifications through the centralised pharmacy server. This data segregation will prevent the stakeholders of the manufacturers' database from extracting data on procurement and sales volumes of individual pharmacies, thereby ensuring complete data privacy. Since securPharm represents the German component for the security network of the European Stakeholder Model (ESM) for the protection against falsified medicines, the European hub has already been connected to the database of the pharmaceutical industry of securPharm. This connection is continuously expanded.

END-to-END VERIFICATION SYSTEM

Source: securPharm e.V.
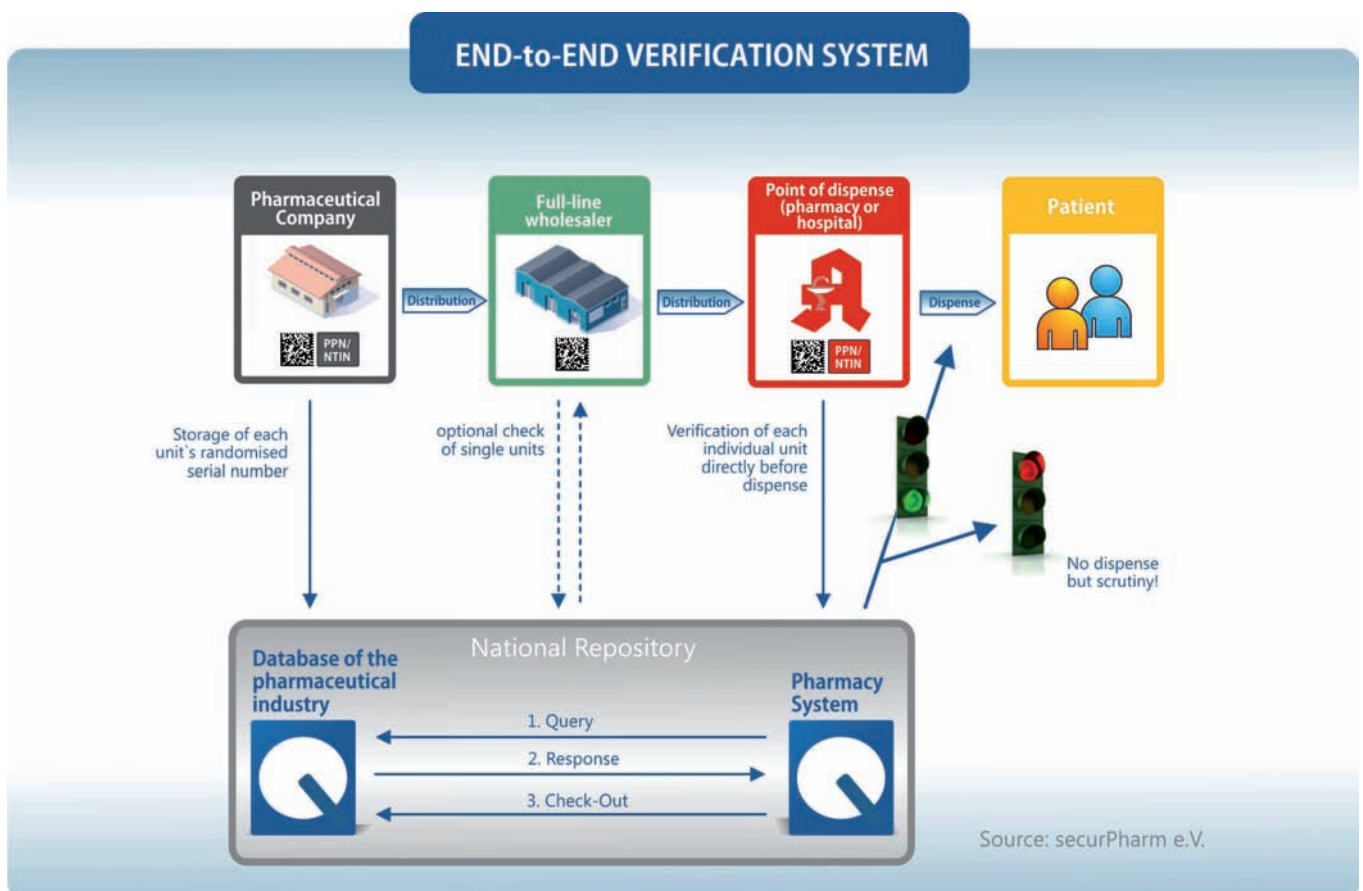
5. Current status of the project

5.1 Involvement of the pharmaceutical industry

5.1.1 Pharmaceutical companies

As of June 2015, 25 pharmaceutical companies are participating in the securPharm project. These include both large, globally active companies with extensive experience in serialisation or coding of medicinal products in other markets (e.g. Turkey, France or China), as well as small and medium-sized enterprises from Germany, many of whom have been faced with these issues for the first time.

The participants also include parallel importers, who are particularly affected by the EU Directive. On the one hand, they will function in the future system as dispen-

5.1.2 Operating company of the manufacturers' database

The pharmaceutical industry associations established ACS PharmaProtect GmbH, which is in charge of specifiying, setting up and operating the database system of the pharmaceutical industry in Germany. The associations also provide the managing directors for this limited liability company. The administrative board is staffed with representatives from the companies of Boehringer Ingelheim Pharma GmbH & Co. KG, Berlin Chemie AG and Dr. Willmar Schwabe GmbH & Co. KG.

It was key for ACS PharmaProtect to bring arvato Systems on board – a company that would develop, implement and operate the manufacturers' database, process product data and operate the interface to the

sing agents who must therefore log out the products they will be distributing under their own name. On the other hand, they are currently already considered pharmaceutical companies who need to generate their own serial numbers and upload these to the system.

Last but not least, companies manufacturing generic drugs, which will likely also require safety features pursuant to the EU Directive, participate in the project as well. All in all, the project includes a representative cross-section of the pharmaceutical companies in the overall German pharmaceutical market.

pharmacy system. The company had a proven track record in IT services and demonstrated its efficiency during comparable projects.

From the outset, the technical system would be scalable to accommodate increasing numbers of manufacturers and products, even to the point of ubiquitous use. For more information on ACS PharmaProtect or details on the pricing model, please visit www.PharmaProtect.de/en/.

5.2 Involvement of wholesalers

The EU Falsified Medicines Directive requires the verification of certain packages by pharmaceutical wholesalers. In order to test the feasibility of wholesalers using the securPharm system, the company PHOENIX Pharmahandel GmbH & Co KG, including all of its German subsidiaries, participates in the project to verify securPharm products according to a defined protocol.

PHOENIX uses the pharmacy system of securPharm and tests its everyday usability through targeted mass-scanning activities. In a second step, the securPharm system was also tested in PHOENIX' returns unit.

The participating pharmacies continue to be supplied by their respective wholesalers, i.e. there is no directed distribution. The wholesalers would like to implement a risk-based approach based on which they would verify any packages not directly delivered by the marketing authorisation holder or pre-wholesale distributors such as returns from pharmacies.

5.3 Involvement of community pharmacies

Since the start of the securPharm project, about 400 pharmacies have registered for participation.

5.3.2 Pharmacy software providers

The heterogeneity of the pharmacy software market is well-represented in the project through the involvement of five pharmacy software providers with a total of eight merchandise management systems. After just a short time, it became apparent that the securPharm system works reliably, irrespective of what software package is used at the individual pharmacy.

The software providers involved in the securPharm project currently have a 70% market share in the pharmacy software market. It is planned that all software packages used in community pharmacies will offer the verification function through the securPharm system in the medium term.

5.3.1 Pharmacy system

ABDATA Pharma-Daten-Service, a business unit of Werbe- und Vertriebsgesellschaft Deutscher Apotheker mbH, was responsible for the planning and implementation of the centralised pharmacy system. In a first step, the system renders the verification queries from pharmacies anonymous and then sends them to the manufacturers' database system. When a positive response is generated by the manufacturers' system, the dispensing pharmacy initiates a second step in the process, which consists of (anonymously) logging the specific package out of the system. If no positive response is received from the manufacturers' system, the package is not dispensed to the patient but investigated instead.

In its database, IFA clearly indicates which pharmaceuticals already bear safety features and can therefore be verified at pharmacies. Products are labeled based on the PZN and therefore based on information provided by the manufacturers to IFA. Using these data, the pharmacy software alerts the dispensing pharmacy employee to perform the verification for a specific pharmaceutical.

5.4 Trends in package data

The pharmaceutical companies have been continuously uploading the serialisation data of their marketed products to the central pharmaceutical industry database system since the end of 2012.

While there were 7.5 million serialised and coded packages for 110 different products (PZN) in the German market in 2013, this number had increased to 13.2 million packages secured with the Data Matrix Code for 150 different packages at the end of 2014. By June 2015, another increase brought the total to about 16 million packages for 180 different products bearing a safety feature that is compatible with the EU Falsified Medi-

cines Directive. This corresponds to more than 100% growth.

However, this significant increase of serialised and coded packages is just one of several criteria for the success of securPharm. It is the organisation's goal to use the experience gained from verifications at the key interfaces between trade partners to optimise the system and to optimally adjust it to the business processes of all parties involved in the supply chain from the outset.

Number of units uploaded into the system (in Mio.)
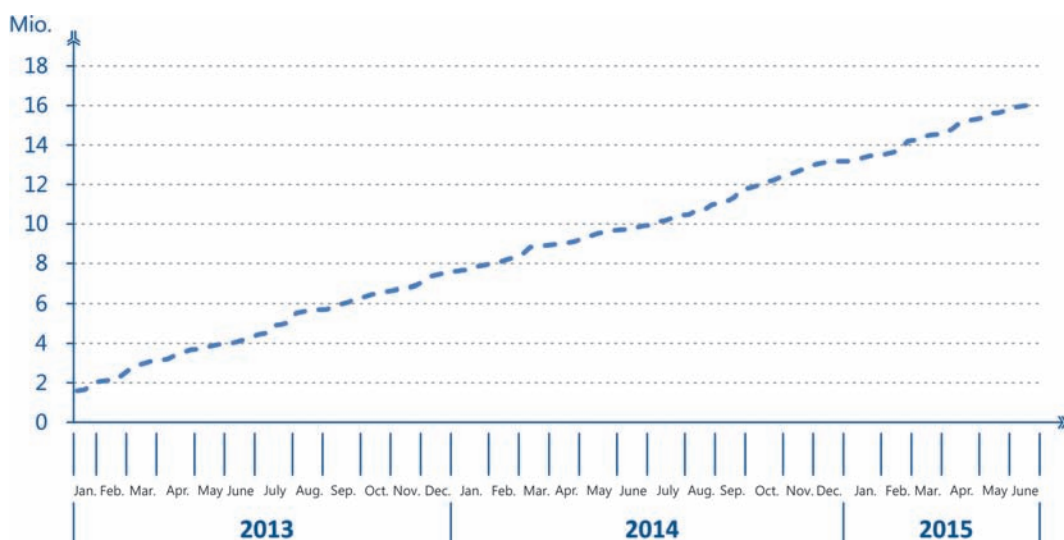
Number of registered products in the system
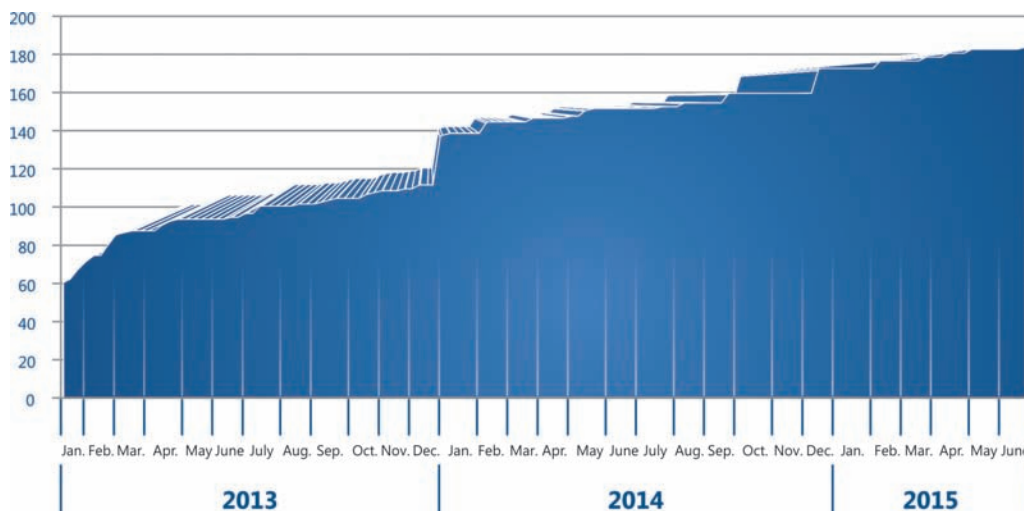
## 5.5 Trends in the verification process

Verifications are performed both at the participating community pharmacies and the participating wholesaler. Both of these stakeholder groups send their verification queries via the pharmacy system of securPharm to the manufacturers' system.

In addition to the verification step, pharmacies also perform an additional process step in dispensing a medicinal product, namely that of logging the package serial number out of the manufacturers' database.

As a result of the increasing numbers of participating pharmacies and the number of packages in the market, the number of verifications performed at pharmacies and in wholesale is also growing.

The number of verifications at pharmacies demonstrates the everyday usability of the system in the context of pharmacy operations, while the targeted mass-scanning activities of the wholesalers show the system's resilience.

Number of verifications
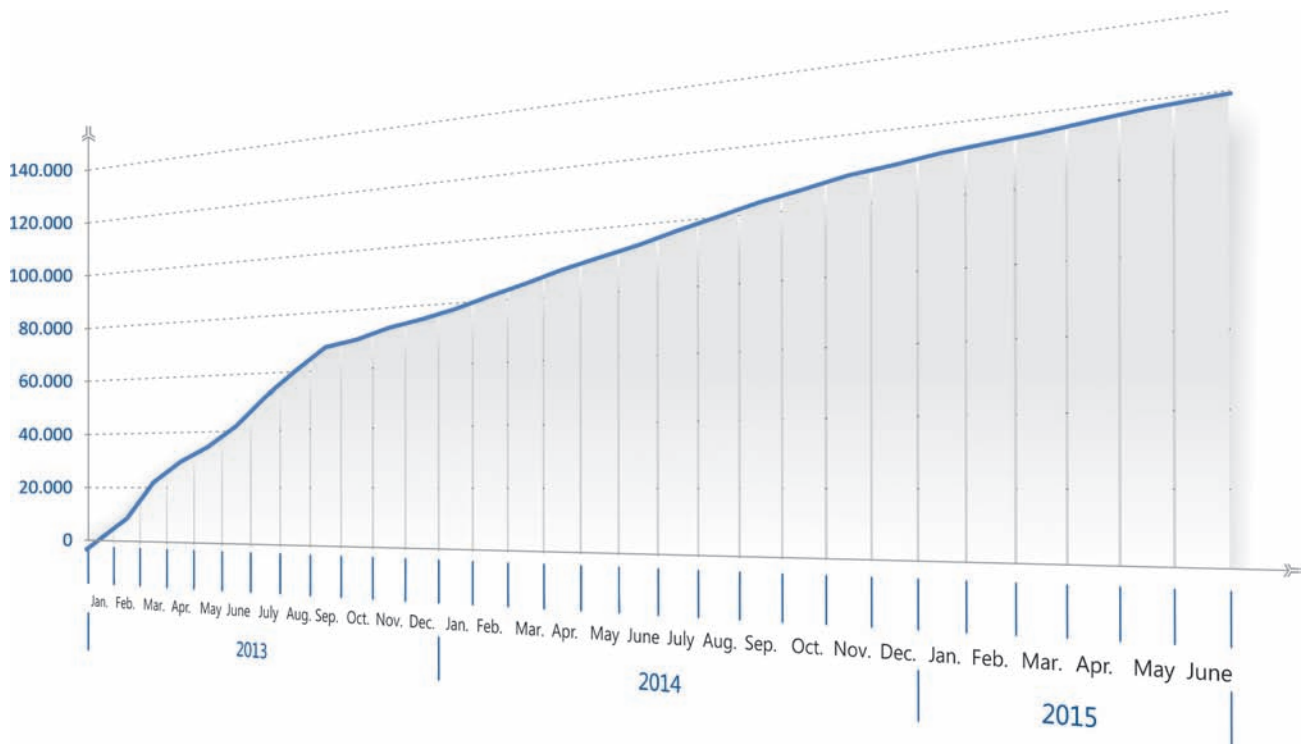
5.6 System performance

Simulated tests for system speed and its impact on processes at pharmacies brought the following results:

The data packages transmitted during verification are very small. Therefore, using an Internet connection with small bandwidth does not present a problem in terms of system speed. Even simulated verifications run on Internet connections with old modems with a bandwidth of 14,400 bits/second resulted in no significant delays.

pharmacy software in use, along with the connections between the various systems.

The measurements taken so far have demonstrated the system's fitness. Deviations with delays in performance can be attributed to the individual pharmacy's implementation of the necessary technical infrastructure for the system. The reaction time of the centralised systems averages 100 milliseconds.

🕐 = **Response time of the Server**   % = **Queries**

🕐	X < 100ms	100ms ≤ X < 120ms	120ms ≤ X < 140ms	140ms ≤ X < 160ms	160ms ≤ X < 250ms	250ms ≤ X
%	20,87 %	57,11%	12,87 %	5,14 %	3,61 %	0,40%

Fastes response: 87ms | **Mean response:** 103ms | **Slowest response:** 3.312ms

The critical factor for the system's speed in the verification process is how many other processes are simultaneously running via the Internet connection. If the connection is at maximum capacity because of other processes (e.g. Internet telephony or order processing), this can in some cases lead to verifications being processed within seconds instead of milliseconds.

The overall system performance depends on the performance of the centralised manufacturers' database, the centralised pharmacy database and the individual

To capture the subjective perception of the system's performance depending on Internet connection speed, two pharmacists – one with a high-speed Internet connection and one with a slower connection – were polled (see sidebar).

Case studies:
System response times
as experienced by two pharmacies

"I've been participating in the pilot since January 2013. Everyone involved, including the software providers, appear to have done a good job. The Internet connection is stable, the server response times are negligible. As such, there are no negative effects on dispensing activities. Of course, in this testing phase, all the possible merchandise management features have not yet been implemented, but I anticipate possible relief regarding more onerous tasks such as management of expiration dates and recalls, aside from the main function of increasing drug safety."

Technical
test requirements
Bandwidth
6000 kBits/s

Excellent

"Typically, the verification process is pretty fast. I usually scan the package during the sale. My software checks whether this is a product that must be verified. If so, verification automatically runs in the background. The result is immediately displayed on my screen. Sometimes there is a slight delay, but this doesn't impact the processes at my pharmacy."

Technical
test requirements
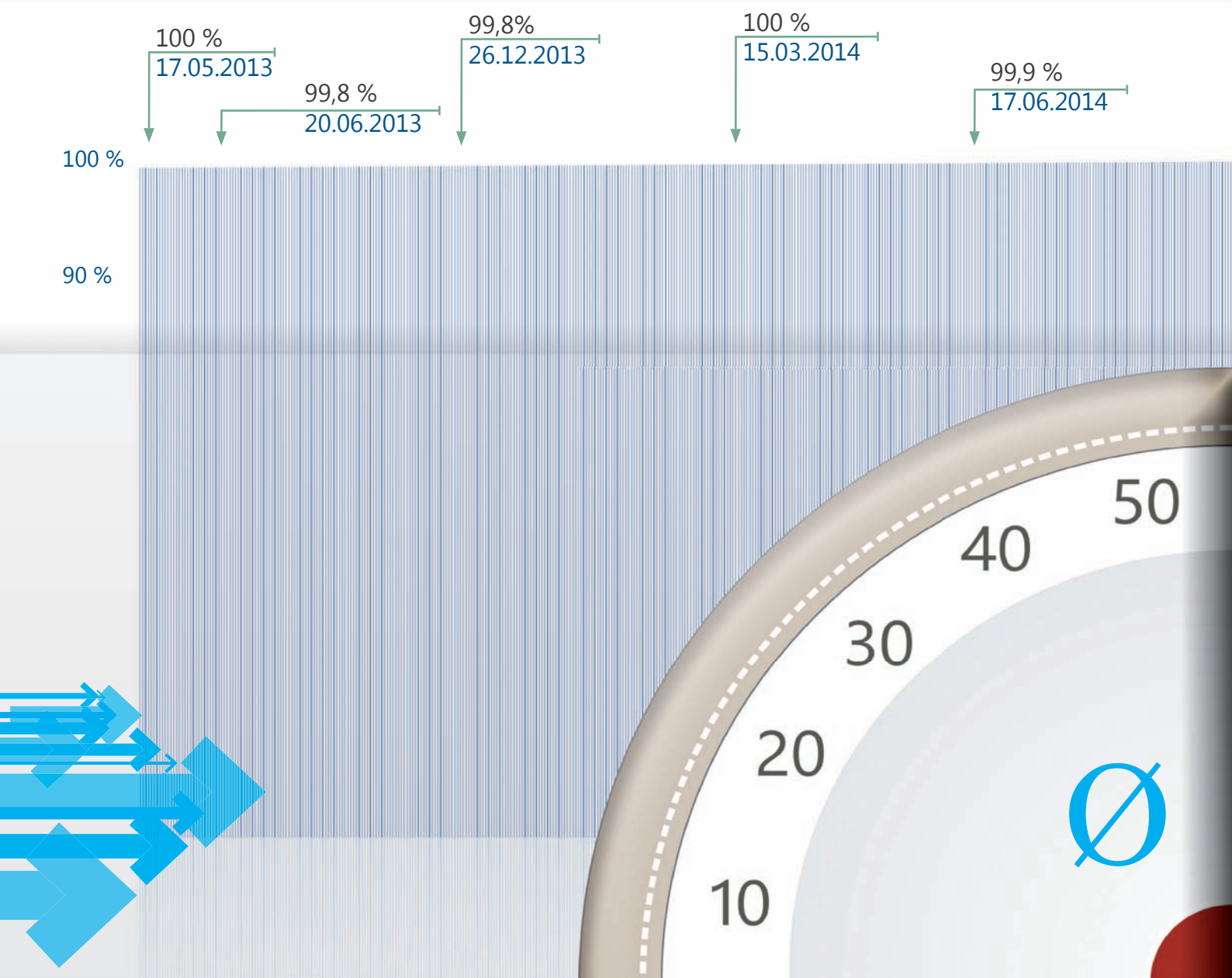Bandwidth
1000 kBits/s

good

5.7 System availability

Another critical aspect of the securPharm system's everyday usability is its reliability, as expressed by system availability. For smooth pharmacy operations, the system must be consistently available at all times, since verifications must be possible even during night and weekend hours. As a result, the system must be available around the clock, 365 days a year.

So far, the securPharm system has proven robust and reliable overall. The system's availability was consistent-

system availability

100 %
17.05.2013

99,8 %
20.06.2013

99,8%
26.12.2013

100 %
15.03.2014

99,9 %
17.06.2014
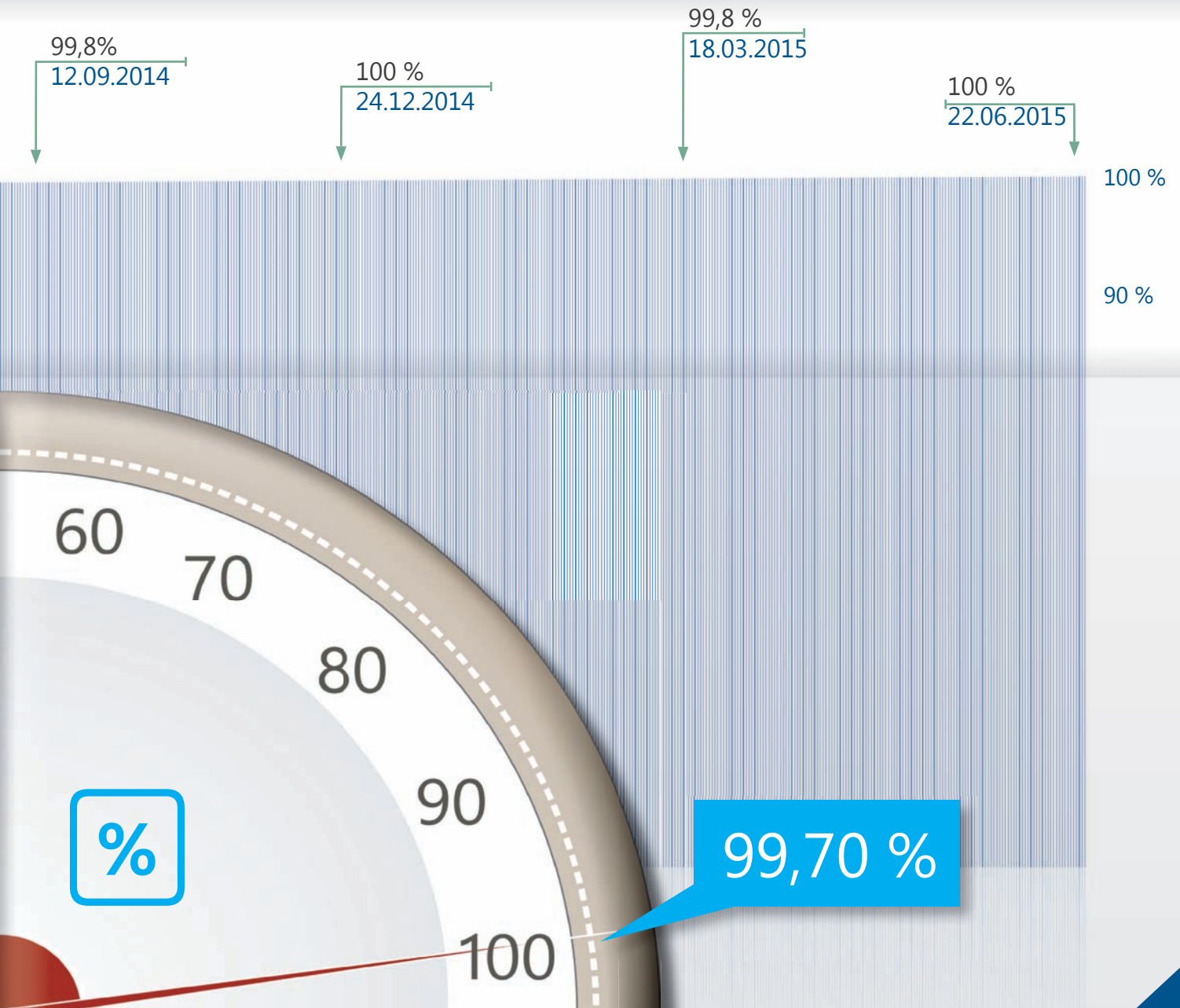
100 %

90 %

50
40
30
20
10

Ø

ly 100% or very nearly so, with the exception of ne-
cessary maintenance downtimes. Even during monthly
maintenance work, there were only two occasions whe-
re this availability was missed by a fraction.

To keep availability at this high level, maintenance
intervals in regular operations will be covered by re-
dundant systems so that availability is not limited by
maintenance activities.

99,8%
12.09.2014

100 %
24.12.2014

99,8 %
18.03.2015

100 %
22.06.2015

100 %

90 %

60
70
80
90
100

%

99,70 %

6. Conclusion and outlook

After an operating time of 30 months, the securPharm project is well on its way. While a variety of milestones have already been achieved, there will be several more for the project partners. The stakeholder associations have started a system for the verification of pharmaceuticals that meets the requirements of the EU Falsified Medicines Directive and works under real-life conditions. In view of the significance and scope of the requirements imposed on all stakeholders in the pharmaceutical supply chain by the Falsified Medicines Directive, they have shown that they are the right partners for implementing these important principles for patient protection.

One of the other goals of the securPharm project, namely to realistically represent the heterogeneity of systems and the diversity of market stakeholders, necessitates a significant amount of coordination efforts between the involved parties.

Any problems arising during project preparation and implementation were solved jointly and provided valuable insight for the further development of the system by all parties involved.

It was and still is extremely helpful that the stakeholders had agreed early on the basic tenets of their cooperation and the project in general. This has led to the results-oriented and practical resolution of all issues (including organisational ones) arising within the project.

Over the past few years, the participating pharmaceutical companies have learned various lessons. At the start of the project, the printing of packages with the Data Matrix Code was a process that was subject to certain variations in quality. However, these difficulties have now been resolved by the companies and printing is a valid process in most cases.

With increasing duration of the project, the management and reliable routing of serial numbers to the central pharmaceutical industry database system is a huge challenge for the companies that can only be mastered internally through the systematic adjustment of IT solutions.

Over the next few months, several additional "stakeholders in waiting" will be included in the securPharm system. For example viable procedures for including hospitals (and their pharmacies) must be developed. Working groups at securPharm and ADKA (Bundesverband Deutscher Krankenhausapotheker – Association of German Hospital Pharmacists) are already tackling the issue.

Additional topics that are being addressed by the working groups of the project partners are international flows of products, the further integration of the EU hub and the analysis of exceptions.

Last but not least, additional companies, wholesalers and pharmacies will be connected to the securPharm system in the future in order to achieve smooth operation of all individual systems before the delegated act finally becomes effective in 2019. To accomplish this, real-life operations will be started long before this date. Pharmaceuticals will then be verified and dispensed to patients only if the results are positive.
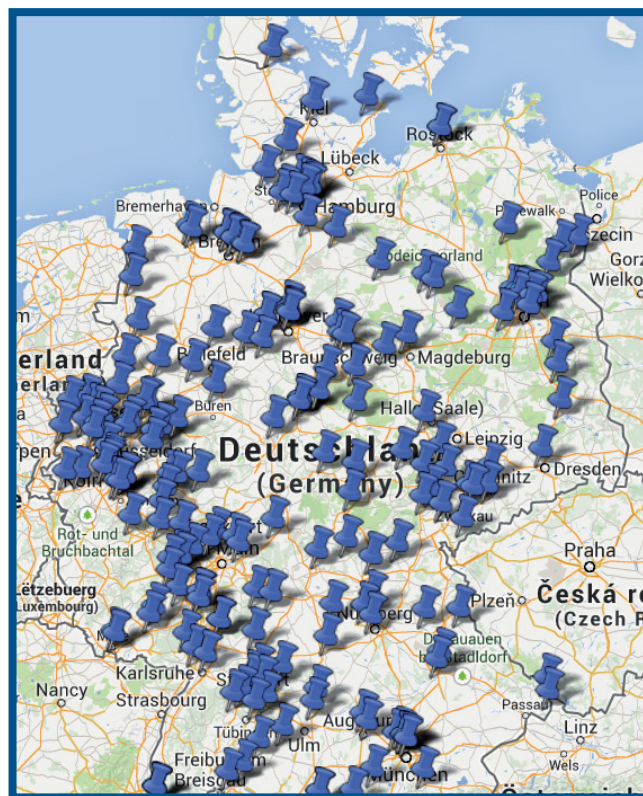
Distribution of securPharm Pharmacies

After 119,000 verifications, the following points can be confirmed:

↗ The planning and oversight of the project by the involved stakeholders (stakeholder governance) is functional and can be supplemented with a national supervisory authority at any time.

↗ The competitive model for the coding system involving two different coding schemes has proven valuable.

↗ Maintaining two separate databases guarantees data ownership for the participants without negatively impacting the overall system performance and safeguards data privacy.

↗ Using the Data Matrix Code as the data medium for verification processes is feasible, efficient and affordable.

↗ The end-to-end approach can be successfully implemented in practice in order to provide sufficient protection against falsified medicinal products in the legal supply chain.

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