December 5, 2017

eVaccination

International comparison – NL / ESP / US

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DXC Technology
Netherlands

DXC.technology

Agenda

1. Introduction DXC
2. Introduction to eHealth in the Netherlands
3. eVaccination (NIP) Netherlands
4. eVaccination Spain & USA
5. ePrescription Netherlands
6. G Standard

Thrive on change

DXC.technology

DXC Technology is the world's leading independent, end-to-end IT services company. We guide clients on their **digital** transformation journeys, **multiply** their capabilities, and help them harness the power of innovation to **thrive on change**.

CSC and HPE Enterprise Services brought innovation to clients for 60+ years

Together, we serve **nearly 6,000 private and public sector enterprises across 70 countries**

Our clients benefit from our **technology independence, global talent, expertise and extensive partner network**

We are **uniquely positioned to lead digital transformations,** creating greater value for our people, clients and partners

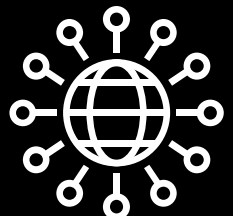
DXC Technology at a glance

DXC
LISTED
NYSE

$25B
GLOBAL IT SERVICES LEADER

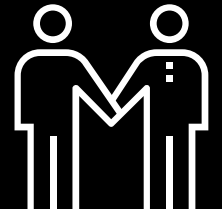
250+
PARTNER NETWORK WITH BEST-OF-BREED PARTNERS

14 STRATEGIC PARTNERS

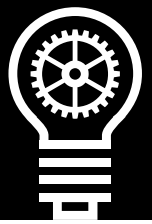


~6,000
CLIENTS

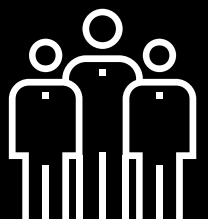
200+ Fortune 500 companies



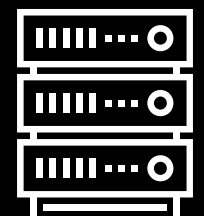
60+
YEARS OF INNOVATION



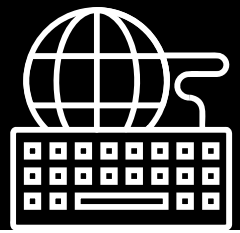
170,000+
EMPLOYEES WORLDWIDE



91
DATA CENTERS

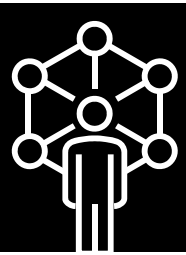


37
STRATEGIC DELIVERY CENTERS



70+
COUNTRIES

3,600+
CERTIFIED PROJECT MANAGERS



Wir zeigen unseren Kunden den Weg in die digitale Zukunft

Unsere Antwort auf Veränderungen in Schlüssel-Technologien

- Digital Applications Experience
- Agile Hybrid Cloud Platform
- Secure Digital Network
- Integrated Digital Service Management
- Hyper-Productive Digital Workplace
- Digital Insurance
- Digital Banking
- Digital Healthcare and Life Sciences

Wir arbeiten sehr eng mit unseren Partnern zusammen

EMC², servicenow, at&t, Hitachi Data Systems, amazon web services, HCL, ORACLE, SAP, Microsoft, workday, salesforce, IBM, lenovo

Wir unterstützen führende Unternehmen und Organisationen

NHS, ZURICH, Intermountain Healthcare, NOVARTIS, GKK, kav wiener krankenanstalten verbund Unternehmen Gesundheit, WGKK, AUVA, KABEG, KABEG MANAGEMENT, BUNDESMINISTERIUM FÜR GESUNDHEIT

Branchenführende IP
Unsere innovative Sicht basiert auf fundierter Branchen-Expertise.

Die richtigen Mitarbeiter
Unsere Spitzentechnologie zielt auf eine Verbesserung der Geschäftsergebnisse ab.

Wissen, wie es geht!
Nachweisbare Steigerung der Qualität bei gleichzeitiger Realisierung von langfristigen Einsparungen

Globale Reichweite
Präsenz und Bereitstellung komplexer Lösungen

Gesundheitswesen und Life Sciences

40+
Jahre Branchenerfahrung

1 Mio.+
Software-Anwender

15.000
Pharmaprodukt-Freigaben

6.000
Profis zur Betreuung unserer Kunden

5.000
Installationen von klinischen Systemen

30+
Länder

Streamlined offerings combine best innovations from CSC, HPE-ES and partners

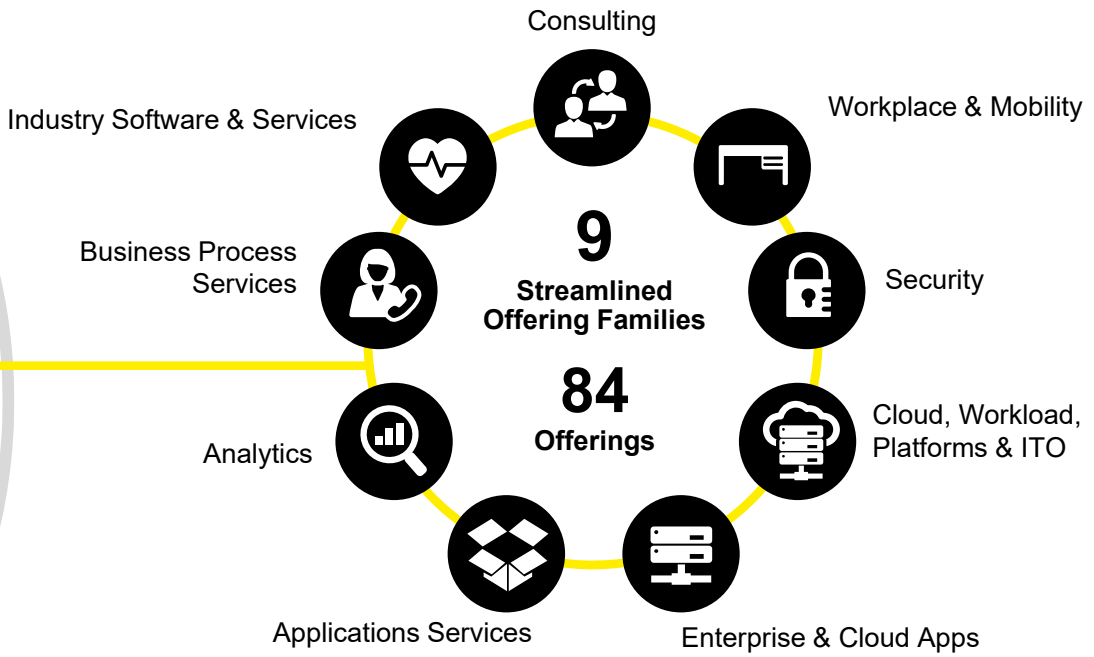
230 offerings | 14 families

Hewlett Packard Enterprise

HP Enterprise Services

Workload and Cloud Solutions	Applications Services and Program Excellence
Mobility and Workplace Solutions	Transformation
Mergers, Acquisitions & Divestitures Services	Business Process Services
Enterprise Security	Analytics and Data Management
Industry Solutions	

270 offerings | 9 practices



Retain and build on the best of innovation

Align offerings to customer preferences

Drive clarity among clients from day 1

Introduction to eHealth in the Netherlands

Multi-enterprise business model:

- 100 hospitals, 4500 GP Practices, 1800 pharmacies, 100 locum tenency services for GP's, each responsible for their own finance, medical policies, investments and IT.
- Interoperability problems on all levels

Architecture rules:

- Leave information at the source – Responsible, unambiguousness, secure.
- Fits to business model
- Focus on connectivity

Overview health care providers LSP Netherlands

This presentation

Already connected 2017

Pharmacy

GP

GP Locum

Hospitals

E prescription

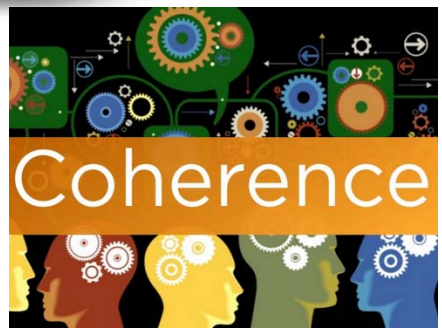
This presentation

To be connected in the near future

Vaccination

YHC

RIVM



To be connected in the near future

LAB

Mentally health care

Mentally disabled care

To be connected in the future

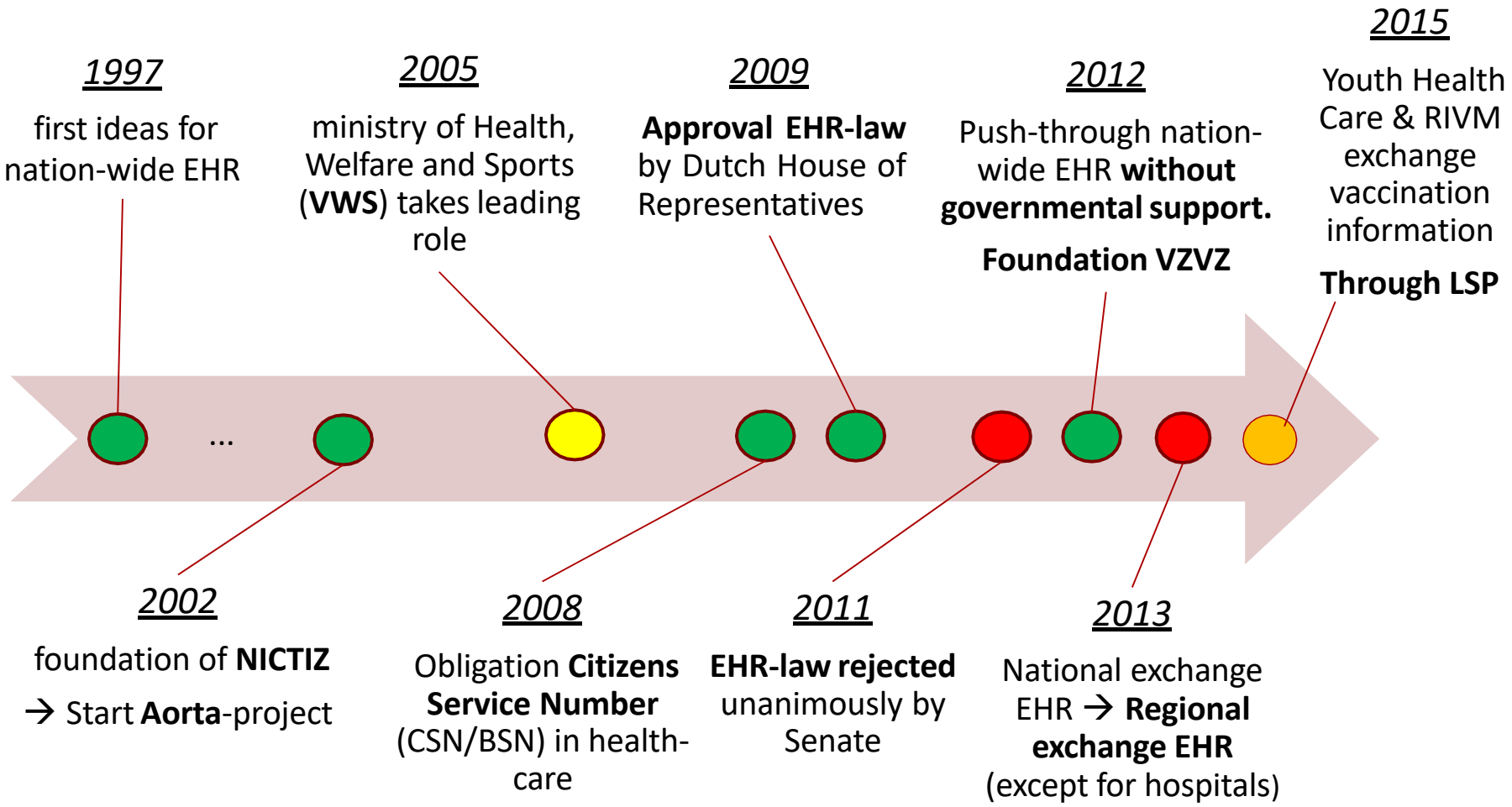
Patients/ Civilians

Others

Nationwide Switch Point (NSP or LSP)

- It is not a record, nor a system but an infrastructure
- Leaving the information at the source!
- In the electronic working environment of the Health Care Professional or Provider (HCP)
- Under the responsibility of the source HCP
- Enabling selective and safe information exchange, between HCP's and HCP's and patient.
- Used for search, find, transfer
- Patient consent registration & Handling
- Identification of patient and HCP with logging by an UZI card

Development towards nation-wide Switch Point (LSP)



VZVZ: Fore and by Health Care Providers

Established bij:

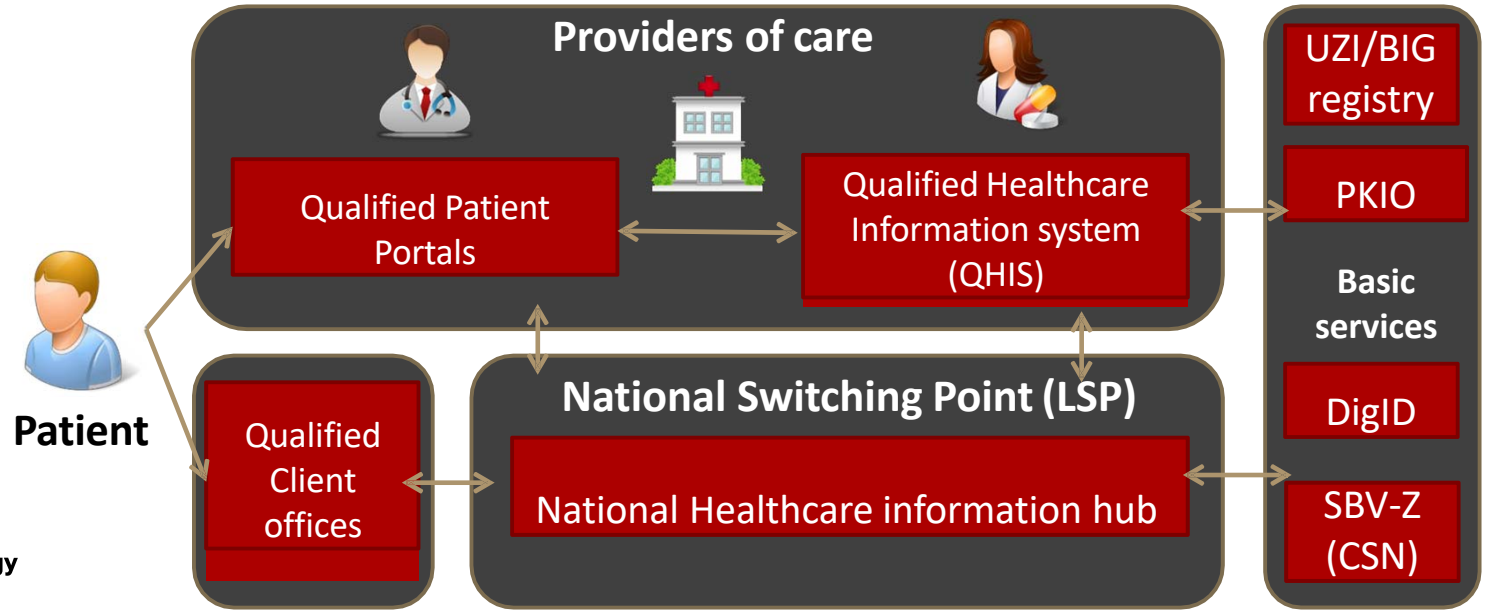
In cooperation with:

Aorta and the LSP

Aorta = The national, standardized infrastructure for exchanging and consulting medical records.

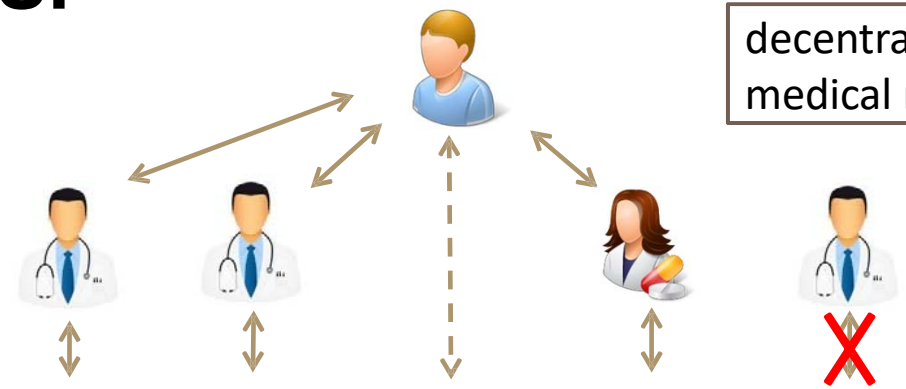
Responsability of:
- NICTIZ (standards)
- VZVZ (technical)

Goals:
1. Facilitating the exchange of medical data.
2. Make it possible for the patient to consult his/her medical records.



Architecture LSP

Intersystems Ensemble



decentralized storage of medical records (by law)

National Healthcare information hub

Act Reference Registry (*Verwijsindex*)

Identification and authentication

Audit Log

Access Contral (Authorisation)

Many additional components ...

Metadata : locations of medical records.

Registers all consultations and adaptations.

UZI/BIG registry

PKIO

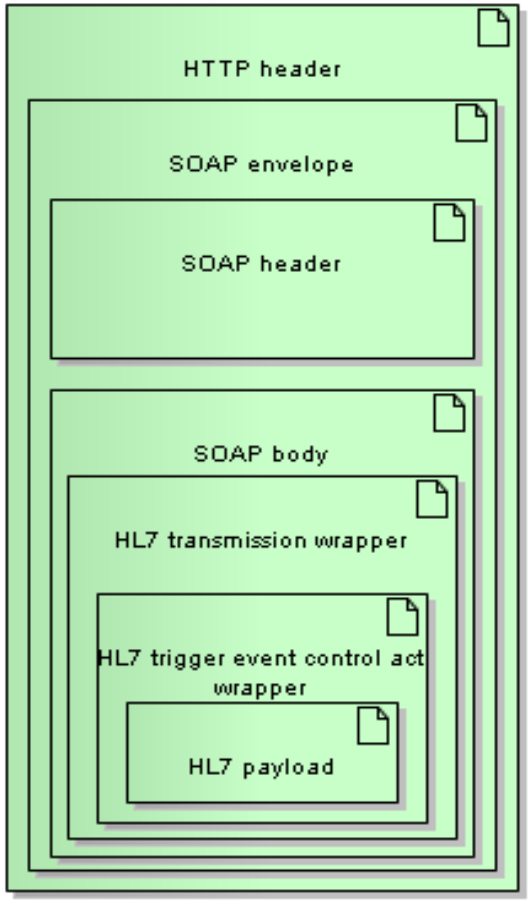
Basic services

DigID

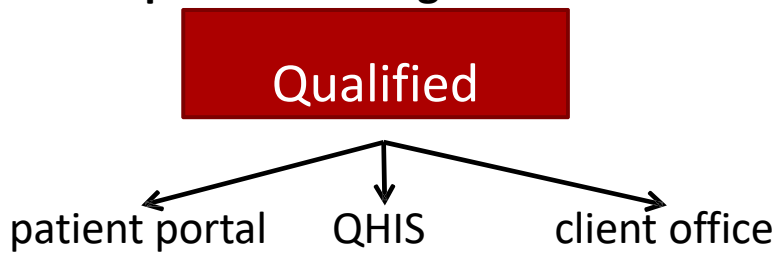
SVB-Z

Standards

Exchange of messages	
Terminology	Snomed CT, ISO 9999, LOINC, ATC, ...
Text	HL7 v3
Transport	SOAP and HTTP
Security	HTTPS



IHE for implementation guidelines



Two parts that need to be qualified;

1. Software on its own (by private providers)
2. Data communication network (DCN) that uses a private TCP/IP

Build & maintained by DXC with Intersystems technology

CSC/DXC staff had very little exposure to InterSystems technology at the beginning of this project

The analysis started in October 2005

As well as CSC staff training in our technology

A functionally complete application was delivered by CSC on the 1st of February, 2006

4 months from kickoff to deployment

Including complete training of staff, setup of the infrastructure, requirement gathering and analysis, development, testing, and deployment

Still maintained and developed by DXC for the Client VZVZ more than 10 years of knowledge

Summary nation-wide LSP

Use of the LSP Mid 2014			Use of the LSP Mid 2017
	Absolute number	% of population	% of population
GP-practices	3312	81%	92%
GP-posts	1687	85%	98%
Pharmacists	111	90%	95%
Hospitals	28	31%	98%
Patient-data	3.614.090 Unique CSN's	21,5%	70%

Why is this important for the Netherlands?

Because it will be the base of all

patient related communication!

Conclusion so far

LSP is used for CURE and will be used in the near future for the CARE (Youth health care, Eldery, mentally disabled, Mentally ill, etcc)

But how about *Prevention*?

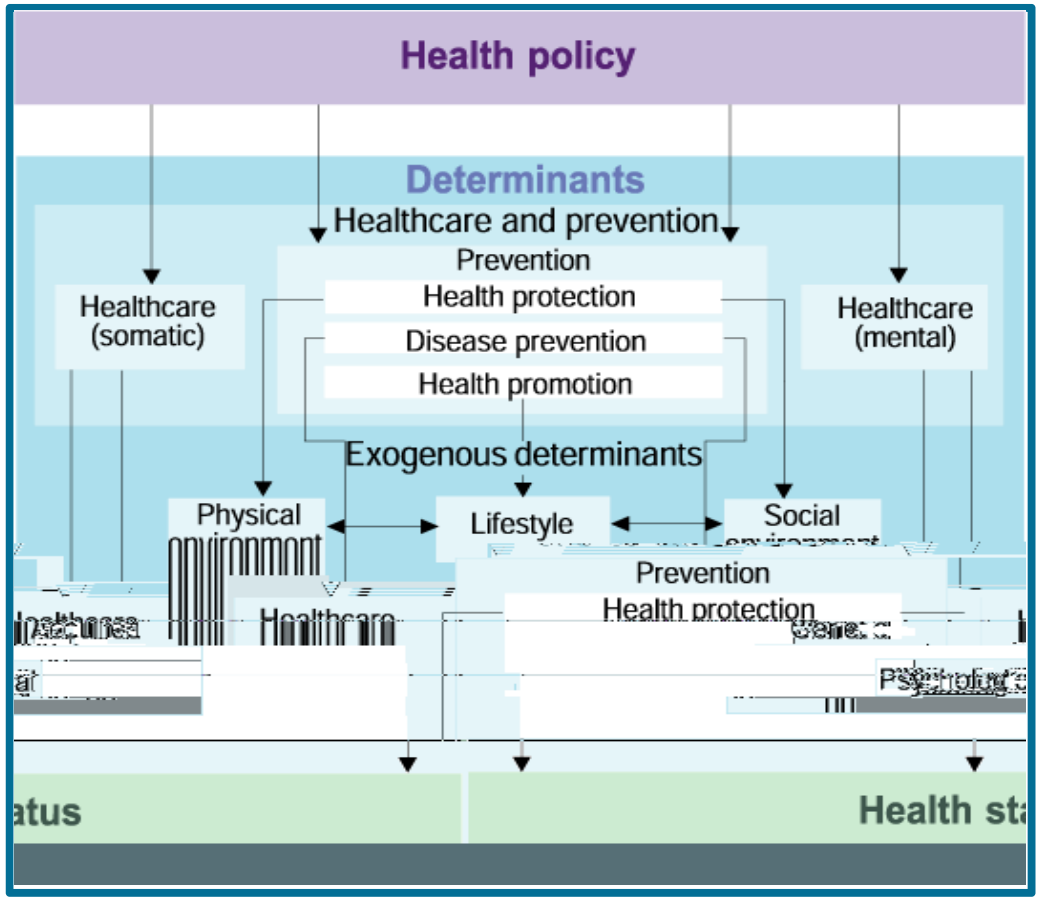
eVaccination NL

RIVM – National Institute for Public Health and the Environment

Nationales Institut für öffentliche Gesundheit und Umwelt

RIVM works to ***prevent and control*** outbreaks of ***infectious diseases***. To ***promote public health*** and ***consumer safety***, and helps to protect the quality of the environment. ***RIVM collects and collates knowledge*** and information from various sources, both ***national and international***. They ***apply this knowledge*** there selves, and ***place it*** at the disposal of policy-makers, researchers, regulatory authorities and the general public.

RIVM develops models to get grip on reality



National Immunisation Program Netherlands

Vaccination schedule National Immunisation Programme

Phase 1	Injection 1	Injection 2
6-9 weeks	DTaP-IPV Hib HBV	PCV
3 months	DTaP-IPV Hib HBV	
4 months	DTaP-IPV Hib HBV	PCV
11 months	DTaP-IPV Hib HBV	PCV
14 months	MMR	MenC

Phase 2	Injection 1	Injection 2
4 years	DTaP-IPV	

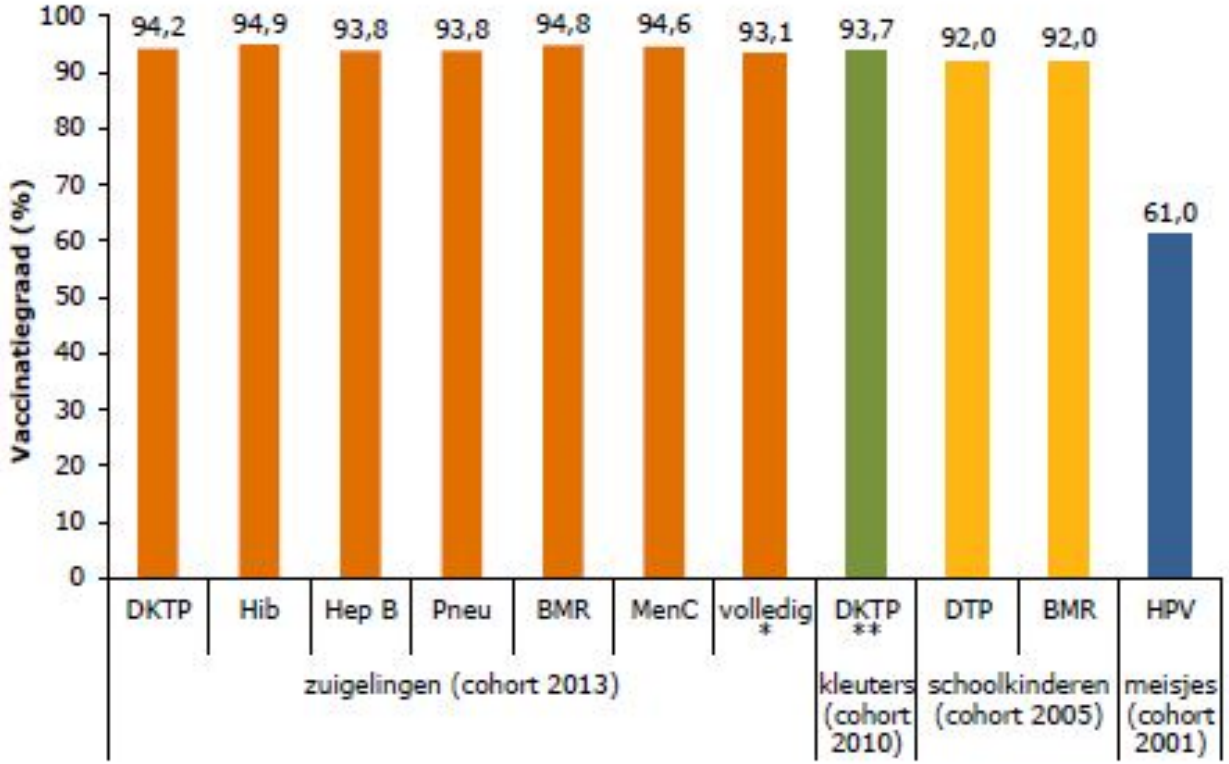
Phase 3	Injection 1	Injection 2
9 years	DT-IPV	MMR

Phase 4	Injection 1	Injection 2
12 years	HPV*	HPV* (6 months later)

Meaning of the abbreviations

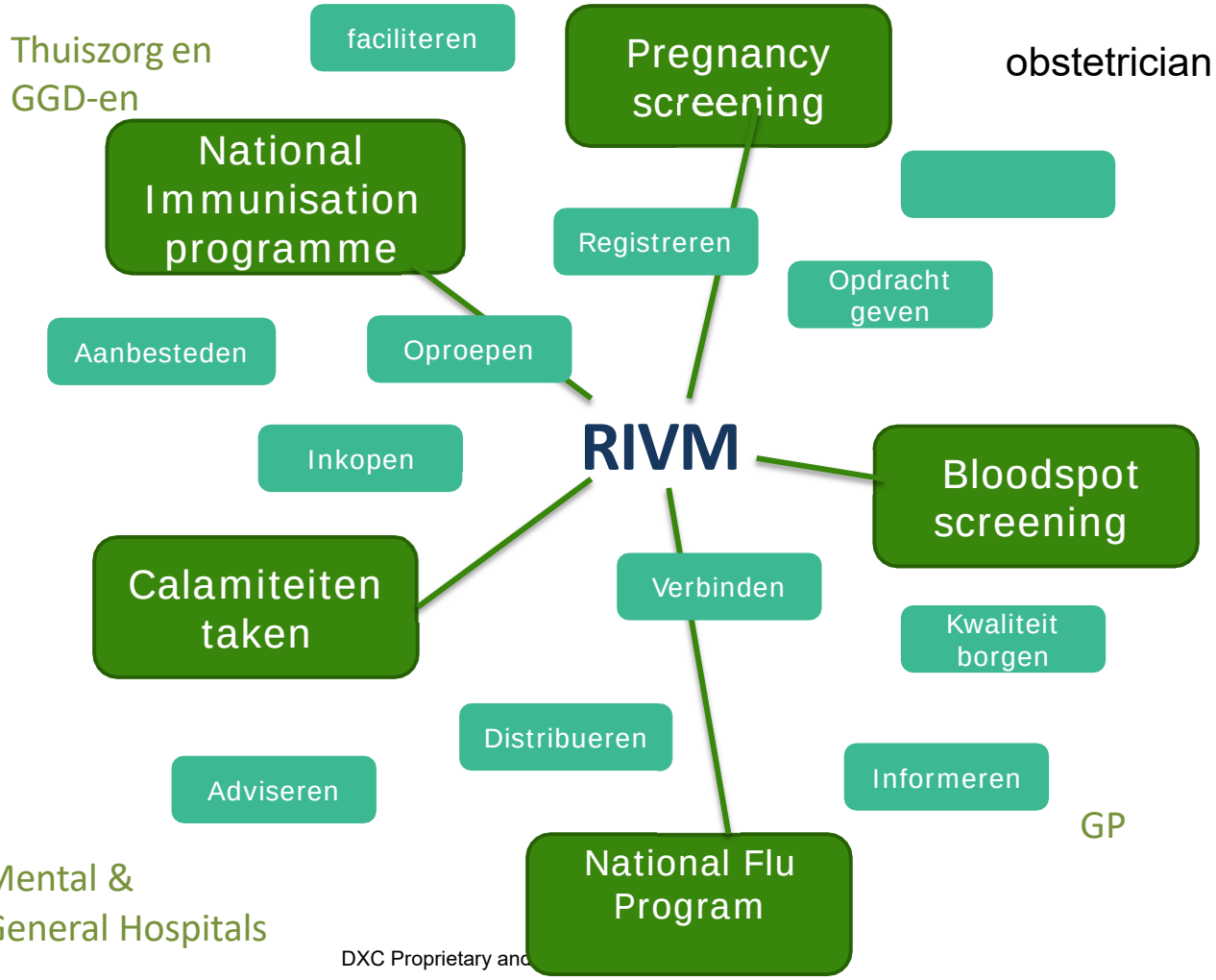
D	Diphtheria	HBV	Hepatitis B	MenC	Meningococcal C disease
aP	Pertussis (whooping cough)	PCV	Pneumococcal disease	HPV*	Human papillomavirus
T	Tetanus	M	Mumps		
IPV	Poliomyelitis	M	Measles		
Hib	Haemophilus influenzae tye b	R	Rubella	*	Only for girls

Percentage vaccination Netherlands

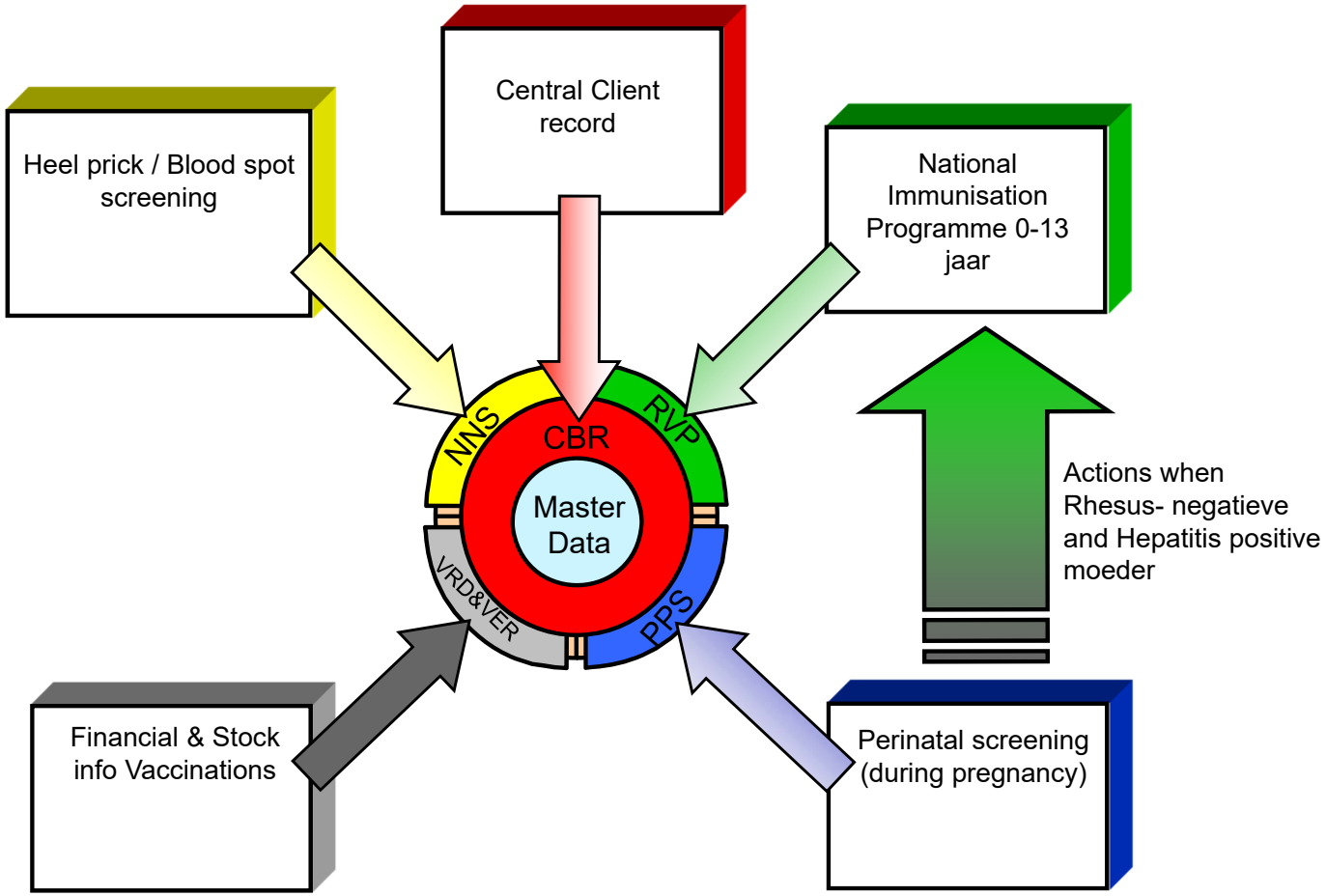


Figuur S1 Vaccinatiegraad (%) per vaccinatie en geboortecohort
Vastgesteld op leeftijd 2 jaar (zuigelingen), 5 jaar (kleuters), 10 jaar (schoolkinderen) en 14 jaar (adolescente meisjes).

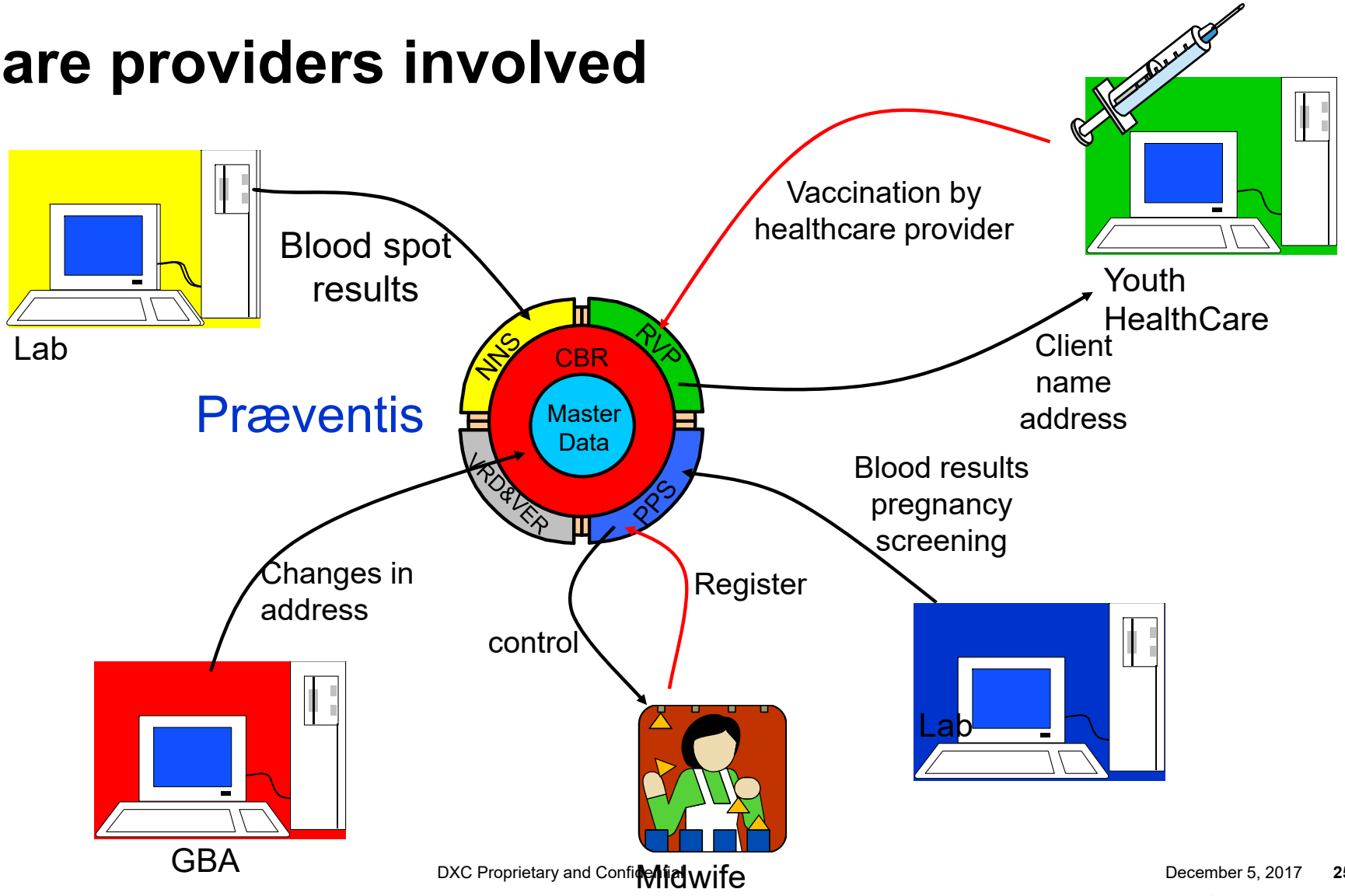
Organisation 2015



Central Database: Præventis



Healthcare providers involved

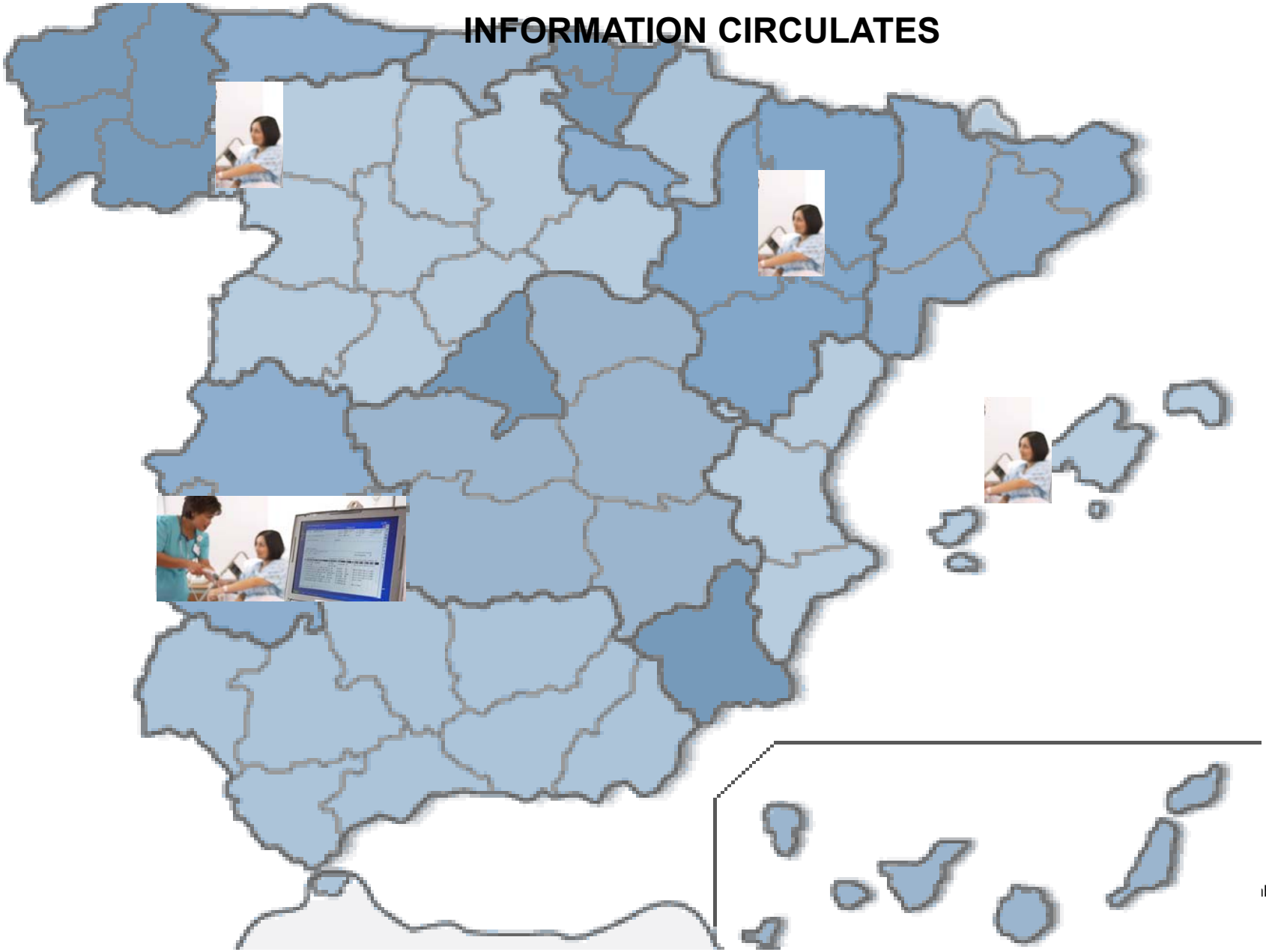


eVaccination Spain

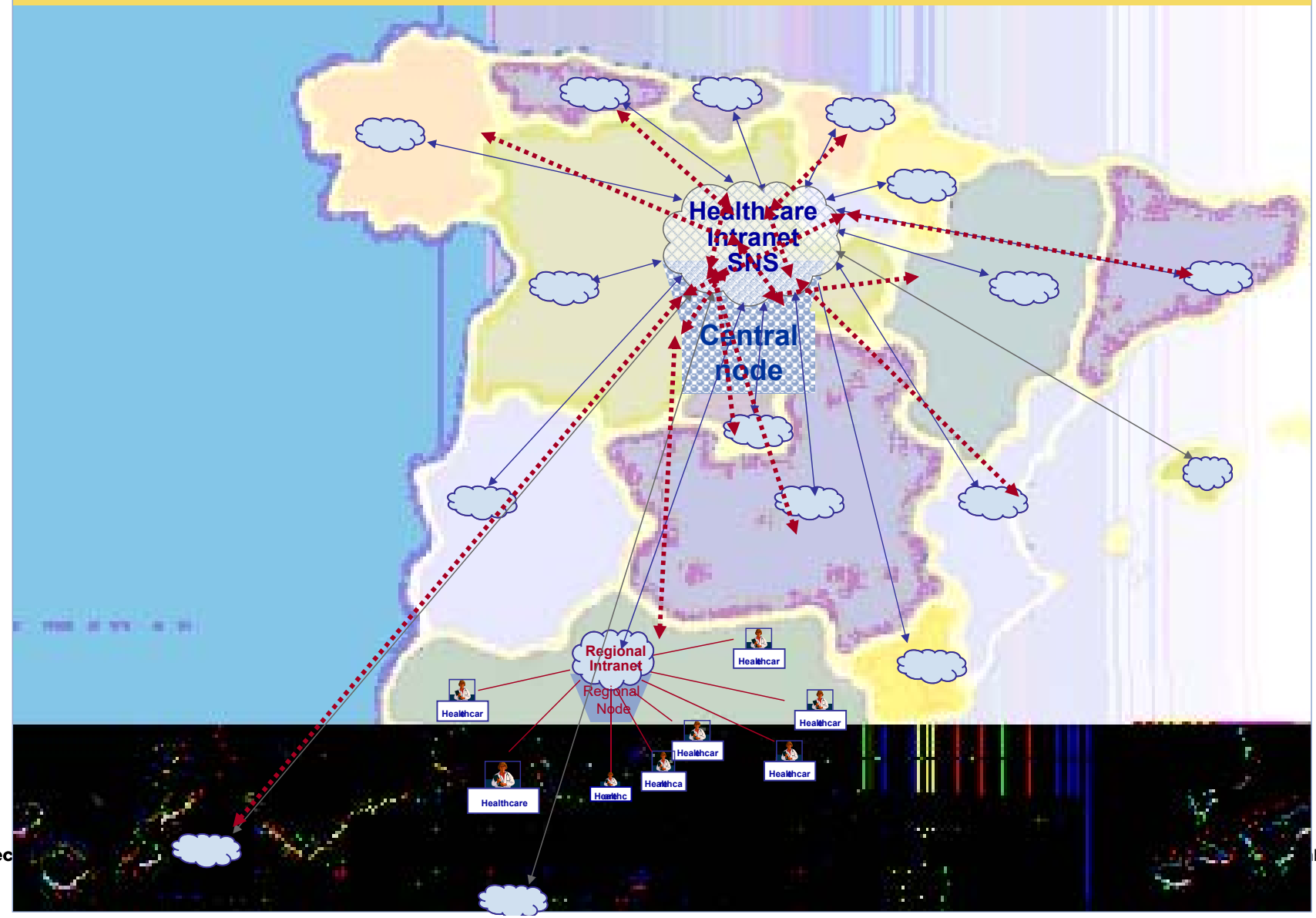
National Health System Spain

- NHS funded by **taxes**
- **Decentralized** to 17 regional autonomous communities (AC) and two cities
- **Universal coverage**
- **Free access**
- **Very wide range of publicly covered services**
- **Co-payment** in pharmaceutical products
- Services provided **mainly in public facilities**
- **Interterritorial Board** to coordinate policies

INFORMATION CIRCULATES



Federal: No Central Data Base but Exchange Data System



Vaccination program in Spain

- 17 AC's and two cities
- Each region has its own Health Care Delivery system
- Different vaccination schedules
- An organisation for dispensing vaccines
- Each AC has its own vaccine advising committee not all vaccinations are free of charge
- There is a recommended schedule by the Spanish Assocation of Pediatrics (AEP)

CONSEJO INTERTERRITORIAL DEL SISTEMA NACIONAL DE SALUD

CALENDARIO COMÚN DE VACUNACIÓN INFANTIL

Calendario recomendado año 2017*

VACUNACIÓN	EDAD									
	0 meses	2 meses	4 meses	11 meses	12 meses	15 meses	3-4 años	6 años	12 años	14 años
Poliomielitis		VPI	VPI	VPI				VPI[a]		
Difteria-Tétanos-Pertussis		DTPa	DTPa	DTPa				DTPa[a]		Td
Haemophilus influenzae b		Hib	Hib	Hib						
Sarampión-Rubéola-Parotiditis					TV		TV			
Hepatitis B[b]	HB[b]	HB	HB	HB						
Enfermedad meningocócica C			MenC[c]		MenC				MenC	
Varicela						VVZ	VVZ		VVZ[d]	
Virus del Papiloma Humano									VPH[e]	
Enfermedad neumocócica		VCN1	VCN2	VCN3						

[a] Se administrará la vacuna combinada DTPa/VPI a los niños vacunados con pauta 2+1 cuando alcancen la edad de 6 años. Los niños vacunados con pauta 3+1 recibirán dTpa.

[b] Pauta 0, 2, 4, 11 meses. Se administrará la pauta 2, 4 y 11 meses siempre que se asegure una alta cobertura de cribado prenatal de la embarazada y la vacunación de hijos de madres portadoras de Ag HBs en las primeras 24 horas de vida junto con administración de

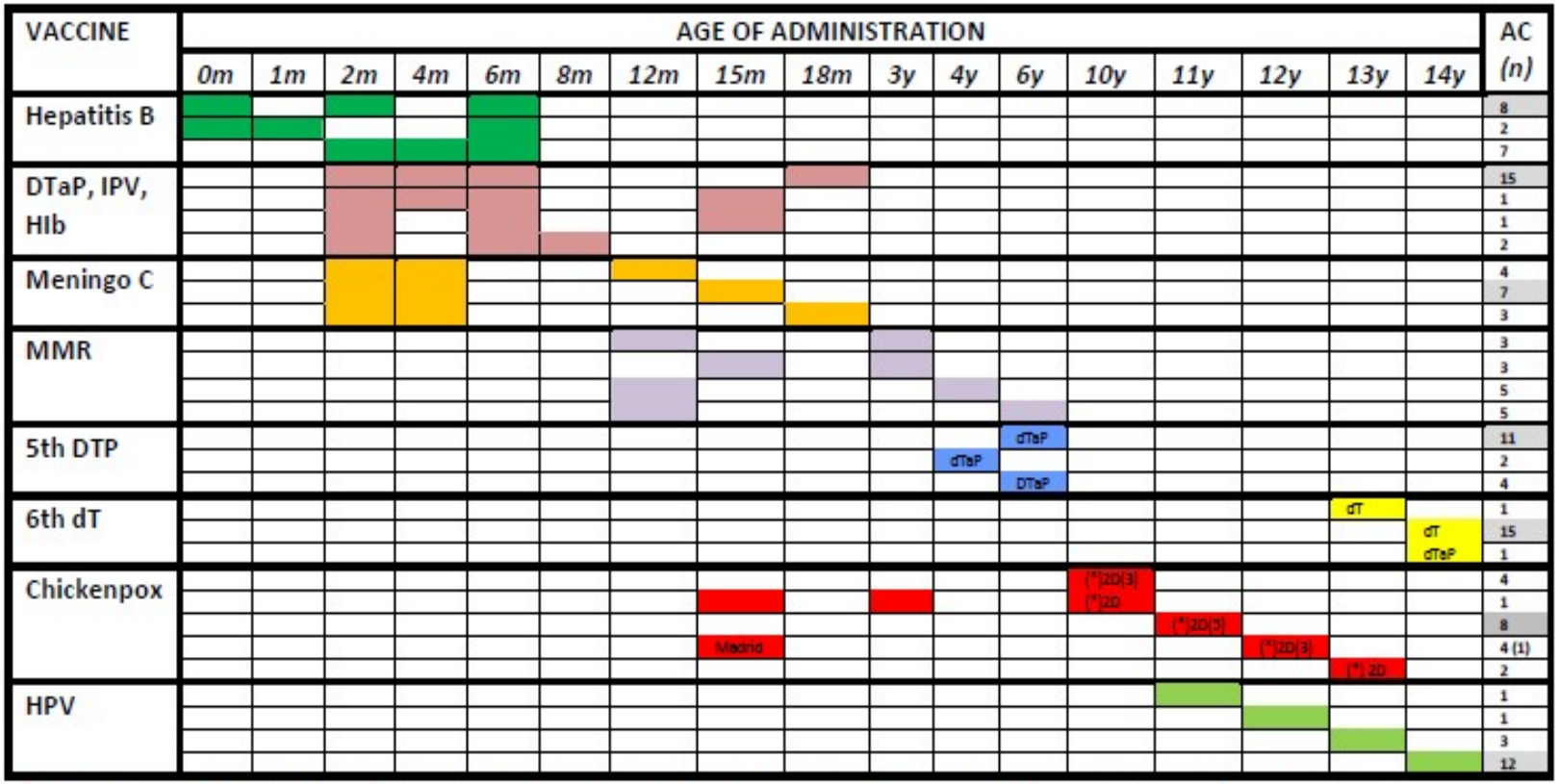
[c] Según la vacuna utilizada puede ser necesaria la primovacunación con una dosis a 4 meses y dos dosis a 2 y 4 meses de edad.

[d] Personas que refieran no haber pasado la enfermedad ni haber sido vacunadas con anterioridad. Pauta con 2 dosis.

[e] Vacunar solo a las niñas con 2 dosis.

*El nuevo calendario se incorporará a partir de enero de 2017. Las Comunidades Autónomas podrán adoptar la introducción a lo largo de 2016.

Between two and five different administration patterns for each vaccine



DTPa: Diphteria Tetanus acellular Pertussis; d:adults Diphteria; IPV: intramuscular Poliovaccine; Hlb: Haemphilus Influenza vaccine; MMR: Measles Mumps Rubella; HPV: Human Papillomavirus; m:months; Y:years (*) if chickenpox disease not suffered previously

Conclusion

xHIS

An electronic patient record (EPR) system that replaces paper-based hospital systems with an electronic record that automatically collects patients' medical and administrative information

eSIAP

Offers primary care and preventive care providers access to the EPR, allowing healthcare professionals to more easily manage patient information and facilitating accurate, up-to-date information sharing 24x7

- **DXC has an EHR solution xHIS with eSIAP**
- **Spain is organised per AC**
- **There is need for a centralised Vaccination solution (and probably more) – but IT can't solve this by itself**
- **Need to now the direction, then change the organisation – then choose the best fitting IT Solution - instead of letting the IT solution change the organisation**

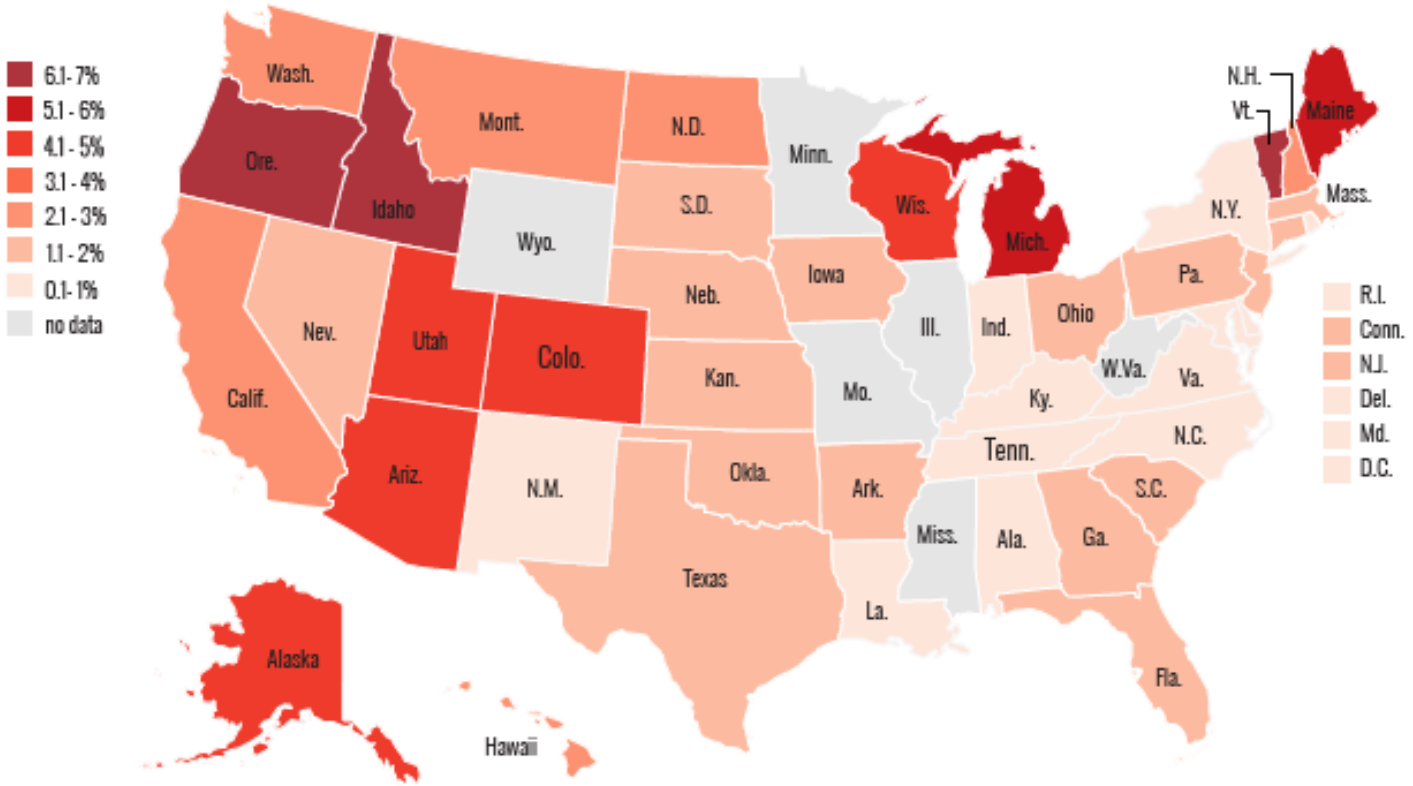
eVaccination US

Vaccination program in US

- State vs Federal
- Each State has its own Health Care Delivery system
- Different vaccination schedules
- Each state has its own vaccine advising committee not all vaccinations are free of charge
- There is a recommended schedule by the Federal Government

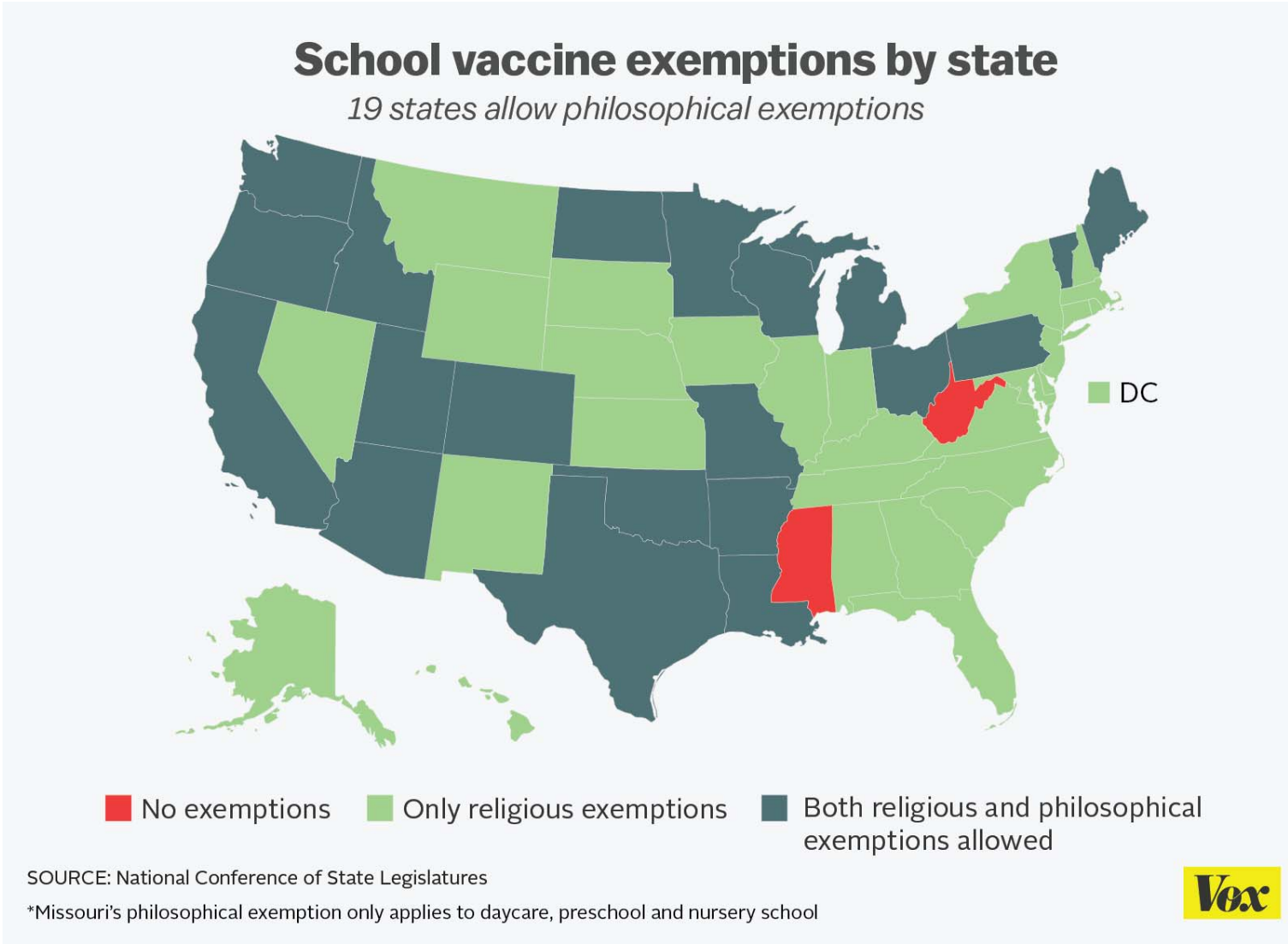
Rate of Nonmedical Vaccine Exemptions By State

Percentage of kindergartners with nonmedical exemptions, 2013-14 school year



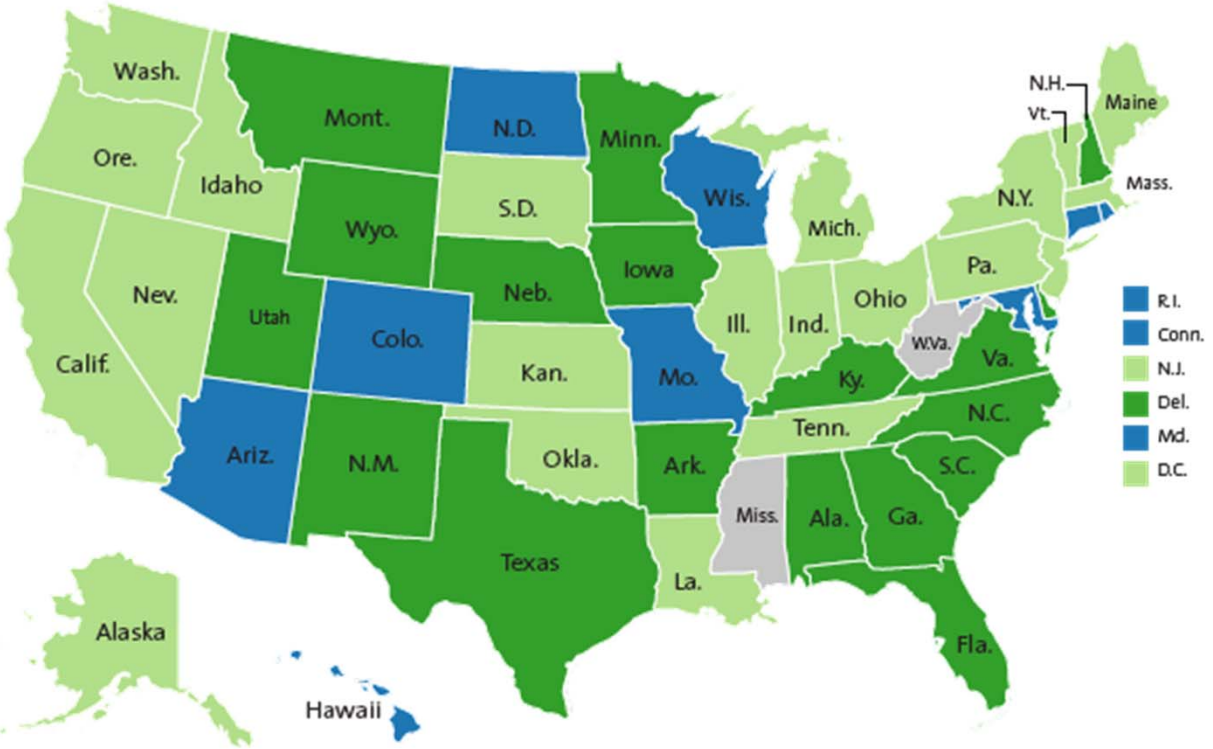
Note: Children with exemptions may still be vaccinated.
Source: Centers for Disease Control

Mother Jones


School vaccine exemptions by state
19 states allow philosophical exemptions
DC
No exemptions
Only religious exemptions
Both religious and philosophical exemptions allowed
SOURCE: National Conference of State Legislatures
*Missouri's philosophical exemption only applies to daycare, preschool and nursery school
Vox

How Hard Is It to Get a Vaccine Exemption in Your State?

- Easy: Parent's signature required.
- Medium: Health care professional's signature required.
- Difficult: Notarized form or both a form signed by a health care professional and a letter of explanation required.
- No data available

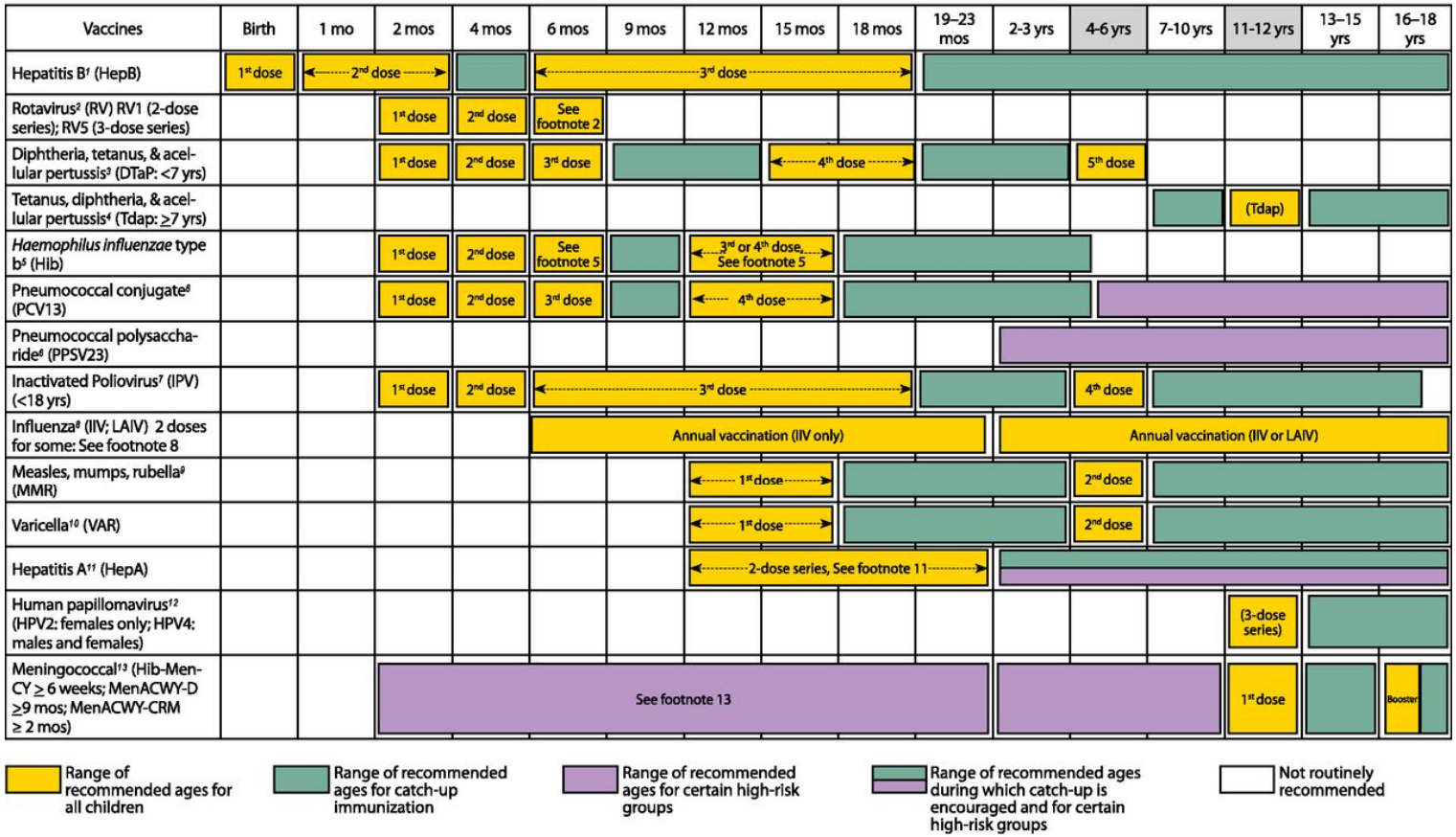


Note: States where new requirements were added after the study's release have been adjusted accordingly.
Source: *New England Journal of Medicine*, 2012

Mother Jones

Vaccine schedule USA

These recommendations must be read with the footnotes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars in Figure 1. To determine minimum intervals between doses, see the catch-up schedule (Figure 2). School entry and adolescent vaccine age groups are in bold.



This schedule includes recommendations in effect as of January 1, 2014. Any dose not administered at the recommended age should be administered at a subsequent visit, when indicated and feasible. The use of a combination vaccine generally is preferred over separate injections of its equivalent component vaccines. Vaccination providers should consult the relevant Advisory Committee on Immunization Practices (ACIP) statement for detailed recommendations, available online at http://www.cdc.gov/vaccines/hcp/acip-recs/index.html. Clinically significant adverse events that follow vaccination should be reported to the Vaccine Adverse Event Reporting System (VAERS) online (http://www.vaers.hhs.gov) or by telephone (800-822-7967).Suspected cases of vaccine-preventable diseases should be reported to the state or local health department. Additional information, including precautions and contraindications for vaccination, is available from CDC online (http://www.cdc.gov/vaccines) or by telephone (800-CDC-INFO [800-232-4636]).

This schedule is approved by the Advisory Committee on Immunization Practices (http//www.cdc.gov/vaccines/acip), the American Academy of Pediatrics (http://www.aap.org), the American Academy of Family Physicians (http://www.aafp.org), and the American College of Obstetricians and Gynecologists (http://www.acog.org).

NOTE: The above recommendations must be read along with the footnotes of this schedule.

DXC US Solution

1995, First DXC Immunization System - Texas

2000, Wisconsin Immunization Registry (WIR) implemented

- Wisconsin develops Licensed Copy of WIR (LCW)

2001, Minnesota signs LCW and implements WIR-based IIS

- WIR Consortium established

2005, DXC implemented and supporting six projects

- WI, MN, GA, AR, NC, and US Virgin Islands

2007, New York selects WIR

2009, DXC receives Service Excellence Award from AIRA

2010, WIR receives Davies Award of Excellence in Public Health recognizing excellence in implementation and use of health information technology

Current, National Leader – Contracted with three largest jurisdictions (NY, TX, CA).

DXC IIS Presence

IIS Presence

DXC.technology

CALIFORNIA (CAIR 2)
Since 2015
Patients: 23,256,128
Immunizations: 197,642,106
Users: 46,658

MAINE (ImmPact)
Since 2016
Patients: 1,390,298
Immunizations: 4,967,089
Users: 10,240

NORTH CAROLINA (NCIR)
Since 2004
Patients: 8,818,275
Immunizations: 107,220,553
Users: 28,244

WISCONSIN (WIR)
Since 1999
Patients: 8,957,390
Immunizations: 93,621,498
Users: 13,126

GEORGIA (GRITS)
Since 2002
Patients: 14,050,467
Immunizations: 159,744,419
Users: 28,013

MARYLAND (ImmuNet)
Since 2010
Patients: 4,734,513
Immunizations: 40,882,027
Users: 12,493

OREGON (ALERT)
Since 2009
Patients: 6,552,537
Immunizations: 58,112,932
Users: 17,264

U.S. Virgin Islands
Since 2014
Patients: 66,342
Immunizations: 820,443
Users: 306

HAWAII (HIR)
Since 2008
Patients: 957,712
Immunizations: 4,425,358
Users: 2,181

MINNESOTA (MIIC)
Since 2002
Patients: 8,102,587
Immunizations: 85,186,211
Users: 13,954

PUERTO RICO (PRIR)
Since 2009
Patients: 2,508,489
Immunizations: 34,606,039
Users: 15,067

IDAHO (IRIS)
Since 2011
Patients: 1,618,363
Immunizations: 18,027,406
Users: 2,357

NEBRASKA (NESIIS)
Since 2008
Patients: 1,972,089
Immunizations: 16,678,543
Users: 7,365

TEXAS (ImmTrac2)
Since 1995
Patients: 8,087,972
Immunizations: 142,644,242
Users: 16,974

IOWA (IRIS)
Since 2011
Patients: 3,697,326
Immunizations: 37,553,549
Users: 29,650

NEW YORK STATE (NYSIIS)
Since 2007
Patients: 7,380,490
Immunizations: 95,517,198
Users: 25,062

VIRGINIA (VIIS)
Since 2006
Patients: 8,710,950
Immunizations: 73,772,450
Users: 6,186

2017 GRAND TOTAL FOR ALL STATES

Clients/Patients: 107,201,375

Immunizations: 1,128,174,802

Users: 245,062

Volumes, DXC Supported Projects (as of July 2017)

State	Contract	Patients	Immunizations	Users
Texas	1995	8,087,972	142,644,242	16,974
Wisconsin	1999	8,957,390	93,621,498	13,126
Minnesota	2002	8,102,587	85,186,211	13,954
Georgia	2002	14,050,467	159,744,419	28,013
North Carolina	2004	8,818,275	107,220,553	28,244
Virginia	2006	8,710,950	73,772,450	6,186
New York	2007	7,380,490	95,517,198	25,062
Nebraska	2008	1,972,089	16,678,543	7,365
Hawaii	2008	957,712	4,425,358	2,181
Puerto Rico	2009	2,508,489	34,606,039	15,067
Oregon	2009	6,552,537	58,112,932	17,264
Maryland	2010	4,734,513	40,882,027	12,493
Idaho	2011	1,618,363	18,027,406	2,357
Iowa	2011	3,697,326	37,553,549	29,650
US Virgin Islands	2014	66,342	820,443	306
California	2015	23,256,128	197,642,106	46,658
Maine	2016	1,390,298	4,967,089	10,240
Totals:		110,861,928	1,171,422,063	275,140

Key Features

- Maintains *population-based* demographics and immunization information
- Provides real-time client deduplication
- Provides clinical support for immunization forecasts
- Provides vaccine inventory tracking and ordering functionality
- Reporting and data analysis tools
  - Outreach tools for keeping patients up to dates
  - Identifying pockets of need and developing strategies to address
  - Vaccine accountability
- Real-time HL7 data exchanges (updates/queries) with EMRs and HIEs supporting meaningful use
- Enables consumer (public) access to immunization records
- Supporting overall immunization event for individual providers as well as local and state health departments

ePrescription NL

ePrescribtion

is the use of health care technology..

- To improve prescription accuracy
- To increase patient safety

Physicians simply have to send prescriptions electronically into the pharmacy's computer system

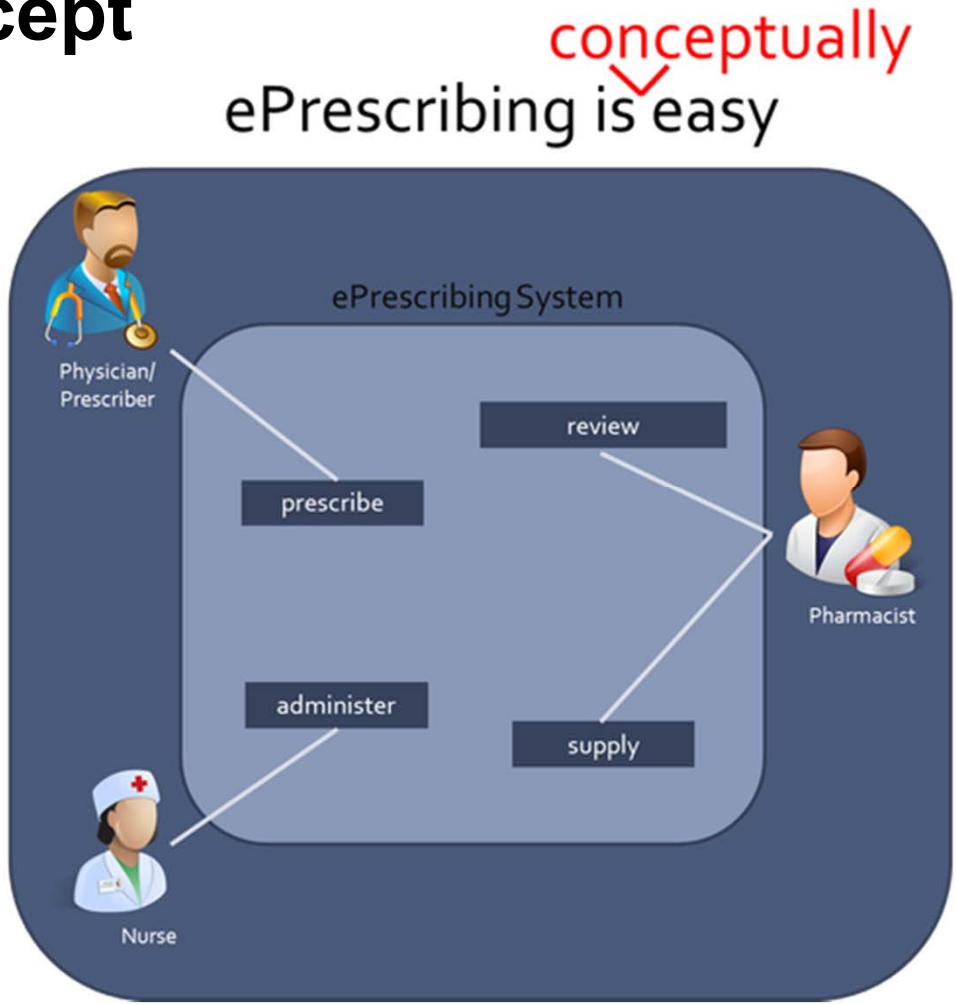
Simplifies healthcare

ePrescribtion Physician practice – pharmacy interoperability

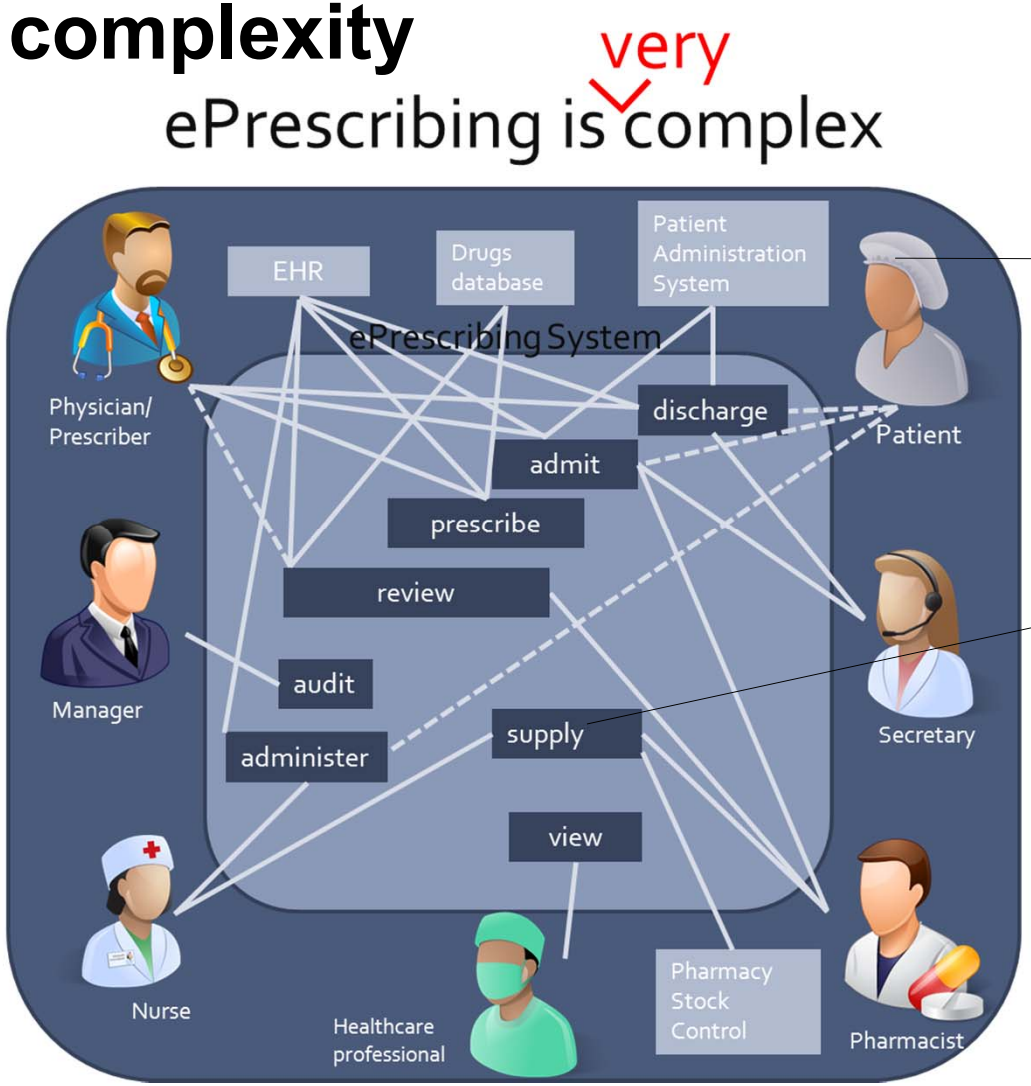
E-prescribing is the totally electronic transmission of prescription information from the prescriber's fingertips to the pharmacist's eyes..

- Computer to computer
- Electronic data interchange (EDI)
- NO PAPER! (unless one so chooses)
- Bi-directional (renewal requests)
- Clinical decision support upfront

ePrescribtion concept



ePrescribtion complexity



- Home medication
- Discharge medication

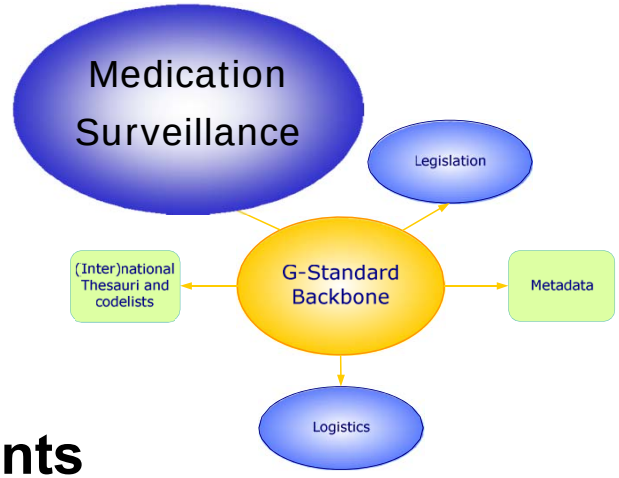
- Drug interactions
- Clinical rules

G-Standard NL

Standardized Interaction Check

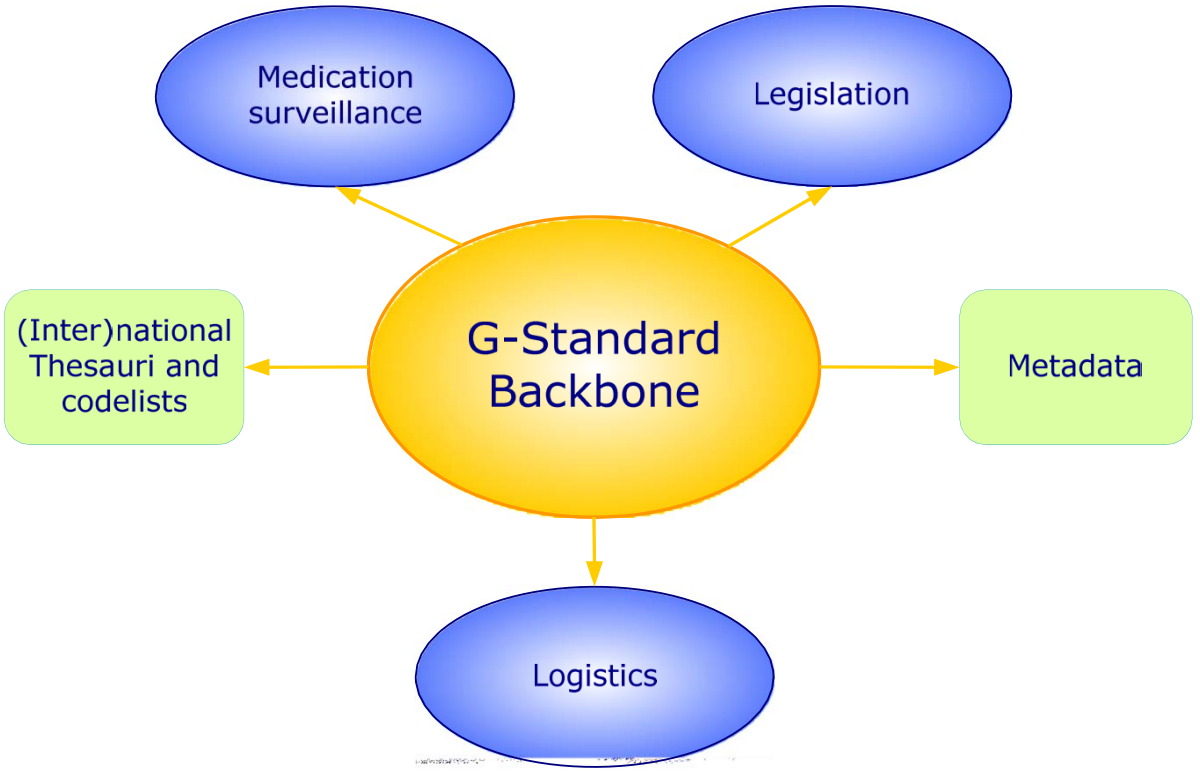
Intermezzo G-Standard: What is it

Medication surveillance



- **Interactions**
- **Co-prescription of identical or comparable active ingredients**
- **Dosage**
- **Counter- or contra indications**
- **Allergy**
- **Pharmacogenetics**

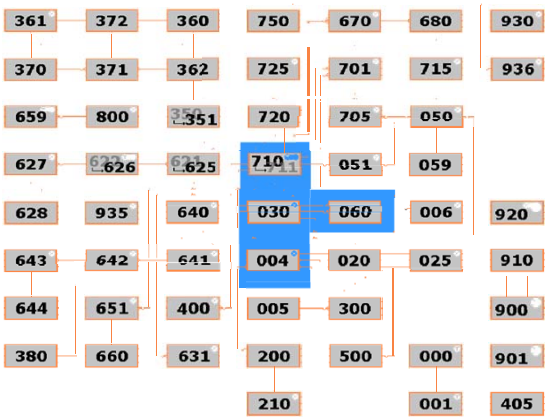
G-Standard: What is it? Data- and Producttypes

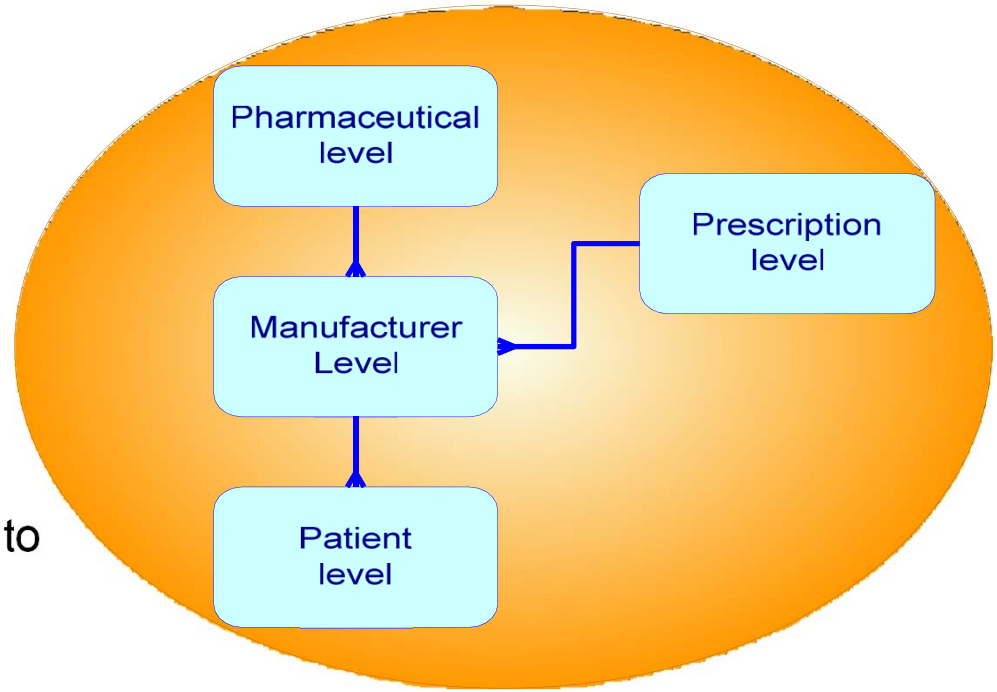


Content of the G-Standard

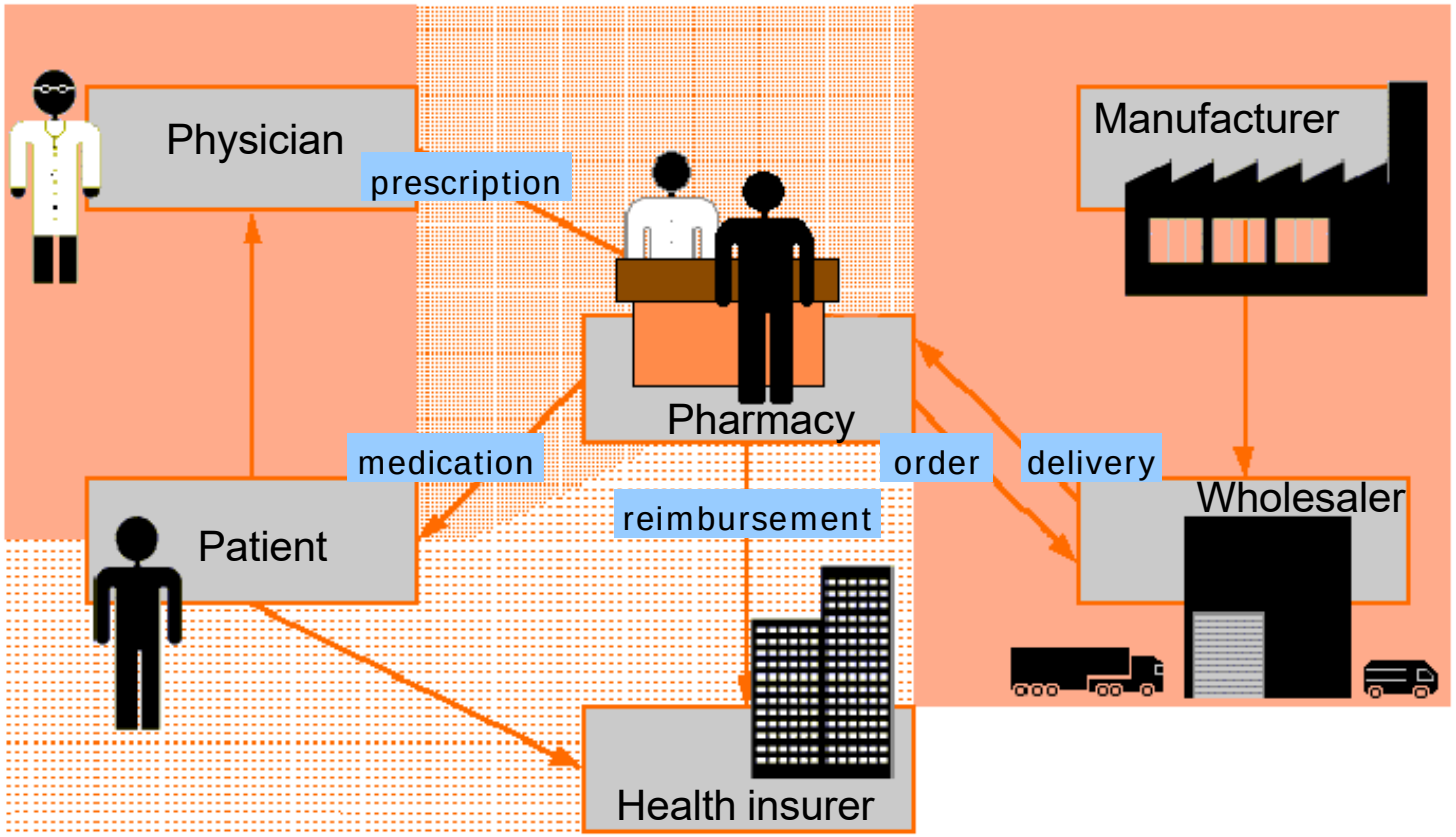
Backbone

- Information of medicinal products on different levels
- Each level contains specific characteristics of a medicinal product
- Sufficient to fit each healthcare process
- All other information is linked to one of these levels of the backbone



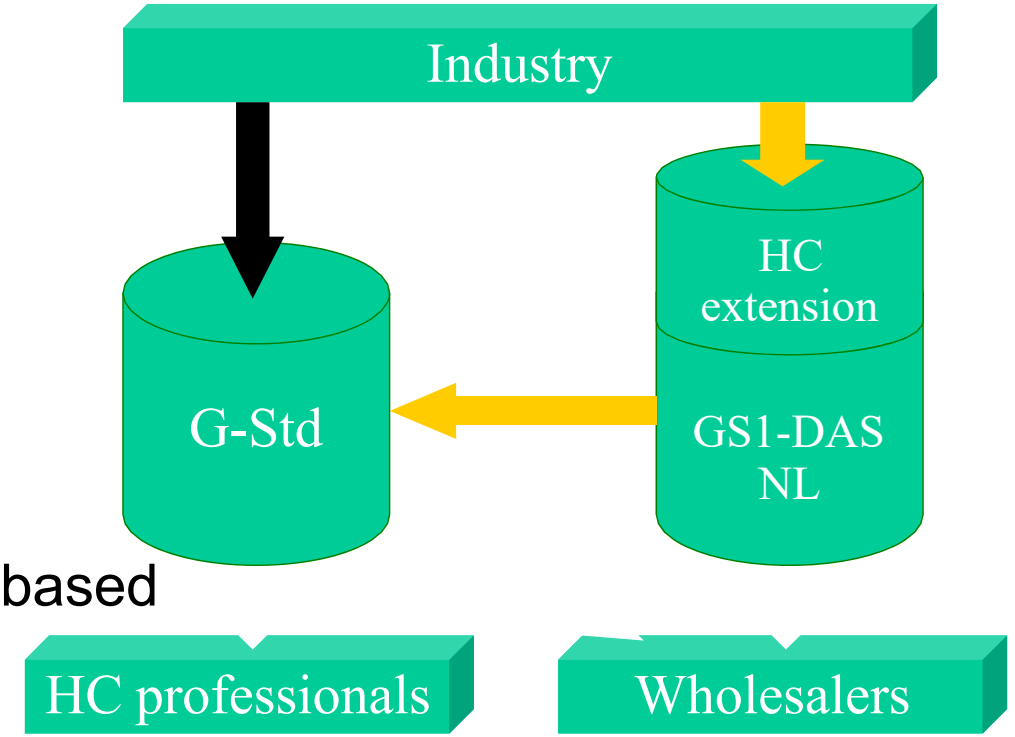


G-Standard: an accepted standard in the whole pharmacy chain



What's so great about it

- De facto standard, proven concept
- High level of medication surveillance
- The constant attention of more than 40 pharmacists
- Input from the field
- The luxury of having too many alerts
- Next generation medication surveillance (based on clinical rules)
- Connecting Healthcare and Logistics



ePrescription safety

→ 39.000 patients in hospital in 2008 because of medication:

- Medication monitoring
  - Responsible care
  - Interactions medication
  - Allergies
  - Incorrect dosage
  - Double medication
  - Contra-indications and other patient characteristics

ePrescriptions Netherlands

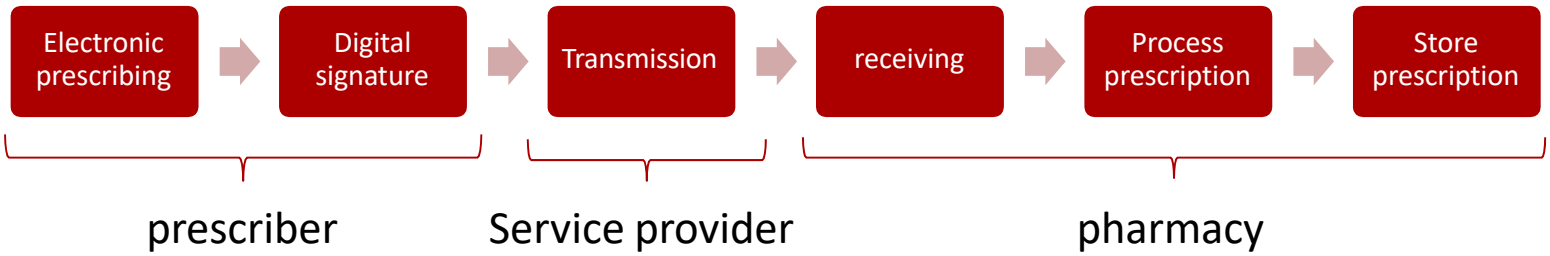
- Netherlands The implementation of the nationwide EHCR was initiated by the National IT Institute for Healthcare in the Netherlands (NICTIZ), which was created in 2002.
- NICTIZ initiated the legal framework for the exchange of patient information and for communication between GPs and other health providers (in terms of the national infrastructure, electronic messages, and safety).
- It also coordinates the implementation of health IT projects and provides a level of national support, including training, a helpdesk, and maintenance of Web-patient portals.
- On January, 2012 the Netherlands implemented a new law that requires prescriptions to be transferred electronically to the pharmacy. Prof. Dr van der Wal, the Inspector General of the Dutch Healthcare Inspectorate announced that the switch to an electronic prescription was due to the numerous errors being made in the dispensation of the medicines.

ePrescription

- In 2008 already 62% electronic prescriptions
- The only way of prescribing from January 1, 2015
- Possible to use different software platforms
  - Only qualified ICT-suppliers
  - “EMD plus” program
- EHR and EVS software platforms have different suppliers
  - Extra work physician to include records in both the systems

ePrescription

- Digital signature with UZI-pas (obligated july 2007)
  - Authenticity – integrity



- Exchange prescriptions
  - With AORTA via LSP
  - Without AORTA directly to pharmacy
- HL7v3 standard
  - Digital signature implemented

ePrescription safety

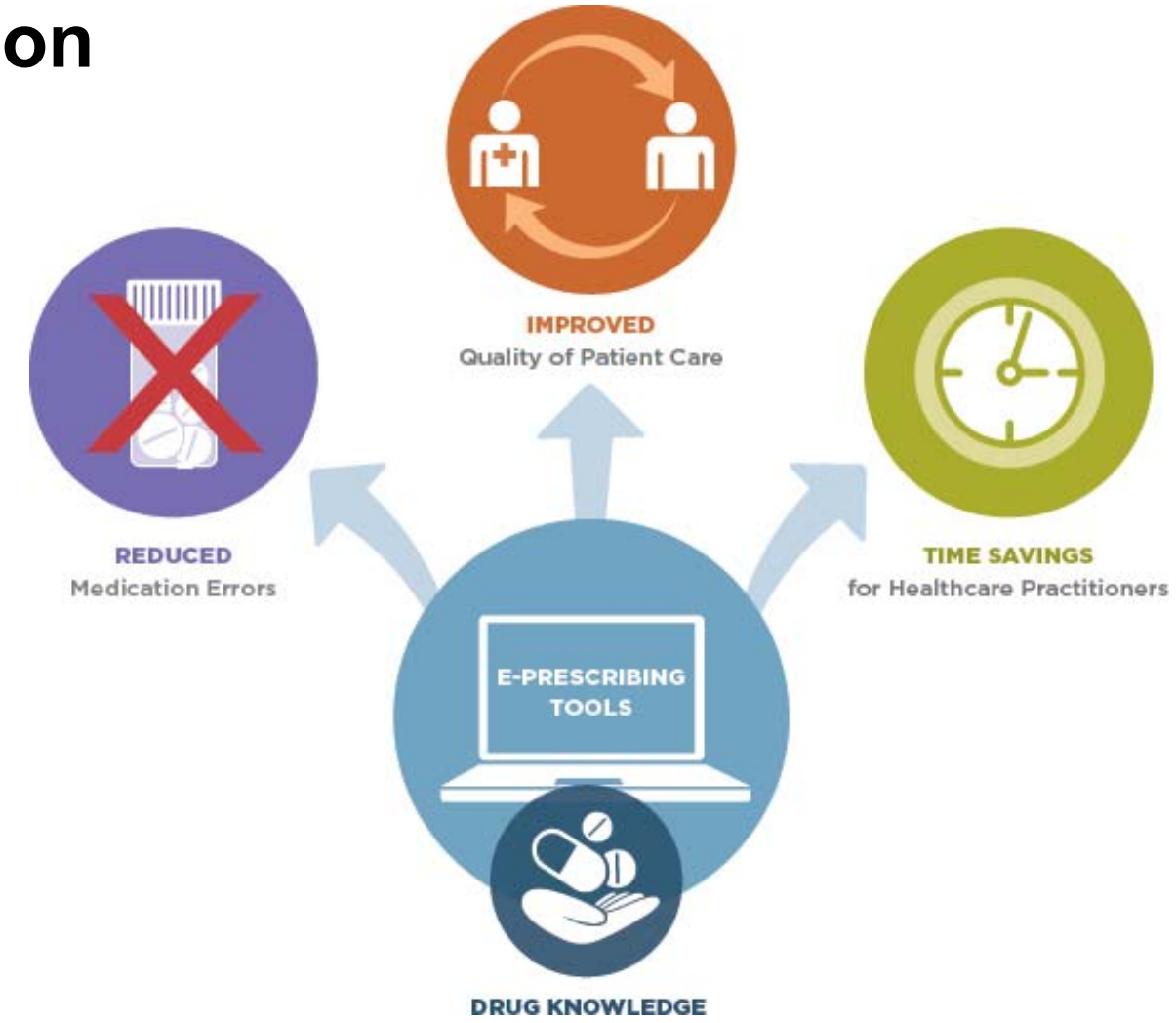
- 39.000 patients in hospital in 2008 because of medication
- 49.000 patients in hospital in 2013 because of medication – 25% more!

Reasons:

- More data available!
- The population is getting older
  - Average age in 2008 was 50
  - Average age in 2013 was 55
  - More medication is given
- Problems with making and applying medication – (four eyes principle)
- Problems with transfer of medication – between Cure and Care (Hospital to nursing home) – focus for LSP

- Electronical medication transfer has given a lot of insights!

ePrescription



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Thank you.