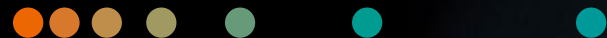


Software Curriculum @ Siemens Healthineers

Linda M. Northrop Software Architecture Award Presentation
May 9, 2019

Frances Paulisch, SHS DC (Healthineers Software Initiative)
Jürgen Vaupel, SHS QT



Siemens Healthineers: Who we are

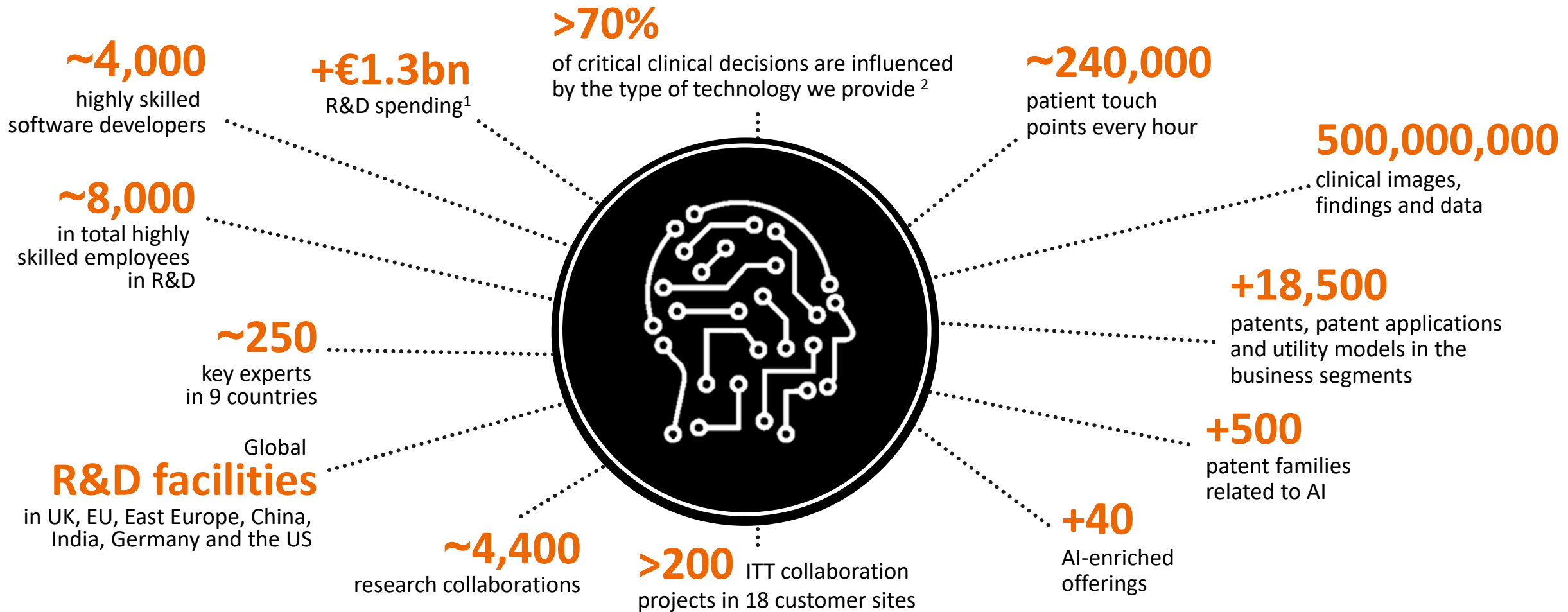


1) Revenue FY 2018

2) AdvaMedDX, "A Policy Primer on Diagnostics", June 2011, p. 3

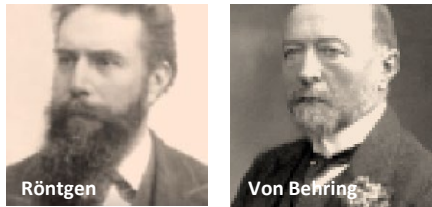
3) Including patents, patent applications and utility models in the business segments

Our commitment to Innovation and Technology



¹ FY2018 | ² AdvaMedDX, "A Policy Primer on Diagnostics", June 2011, p. 3
R&D, Research and development; AI, Artificial Intelligence; ITT, Innovation Think Tank

A long story of success



1901
Nobel prize winners (Physics and Medicine)



1896
Industrially manufactured medical X-ray



1956
CLINISTIX – dry chemistry testing for glucose in urine



1957
Fully automated discrete chemistry analyzer for whole blood or serum



1967
First real-time ultrasound scanner



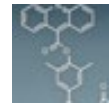
1975
First Siemens CT scanner



1977
First automated protein system launched



1983
First Siemens MRI scanner



1986
First acridinium ester based chemiluminescence immunoassays



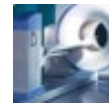
1997
First in vitro whole-blood detector of platelet-function abnormalities



1998
First Siemens track-based laboratory automation system



1999
First intuitive medical IT platform from Siemens



2001
First PET/CT system from Siemens



2005
First Dual Source CT scanner



2006
Diagnostic analyzer integrating four technologies in one system



2008
Robotic-assisted angiography system



2008
Digital radiography, wireless flat panel detector



2009
Multi-modality 3D imaging software



2011
First integrated, simultaneous whole-body MRI and PET



2012
Wireless transducers for ultrasound



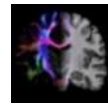
2014
"Free breathing" CT scanning with dual X-ray sources and detectors



2014
Cloud-based network: teamplay



2015
Wide-angle image acquisition breast tomosynthesis



2015
The first research 7T MRI: MAGNETOM 7T



2015
First Twin Robotic X-ray for better patient care and productivity



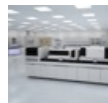
2015
First BTP assay to determine RRF and CSF leakage



2016
Liquid biopsy



2016
Cinematic rendering for 3D medical imaging



2017
FAST 3D Camera – automated precise patient positioning



2017
A whole new world of precision: Biograph Vision¹⁾



2017
Mobile operations for closer patient interaction: SOM-ATOM go.platform



2017
MRI technology adapting to human nature: BioMatrix



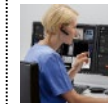
2018
Software for remote scanning assistance: syngo Virtual Cockpit³⁾



2018
More than 40 AI-enriched offerings



2018
AI-Rad Companion Chest CT²⁾ to mark and measure potential abnormalities



2018
Innovation: Planned to redefine the MRI experience⁴⁾



Expanding precision medicine

Transforming care delivery

Improving patient experience

Digitalizing healthcare

Future

1) Biograph Vision is not commercially available in all countries. Due to regulatory reasons, its future availability cannot be guaranteed. Please contact your local Siemens Healthineers organization for further details.

2) AI-Rad Companion is 510(k) pending, and not yet commercially available in the United States and other countries.

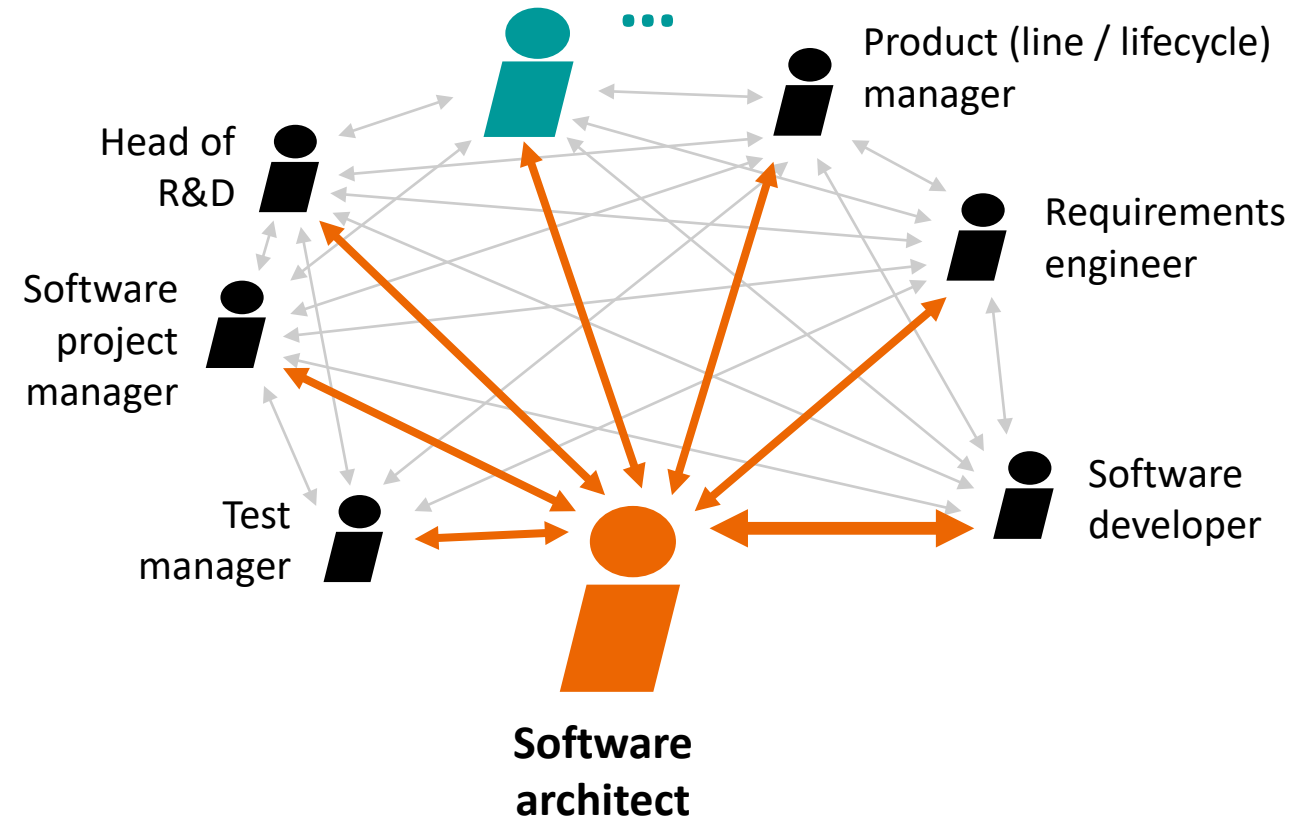
3) syngo Virtual Cockpit is not commercially available yet in all countries. Its future availability cannot be guaranteed.

4) Innovation is still under development and not commercially available yet. It is not for sale in the US. Its future availability cannot be ensured.

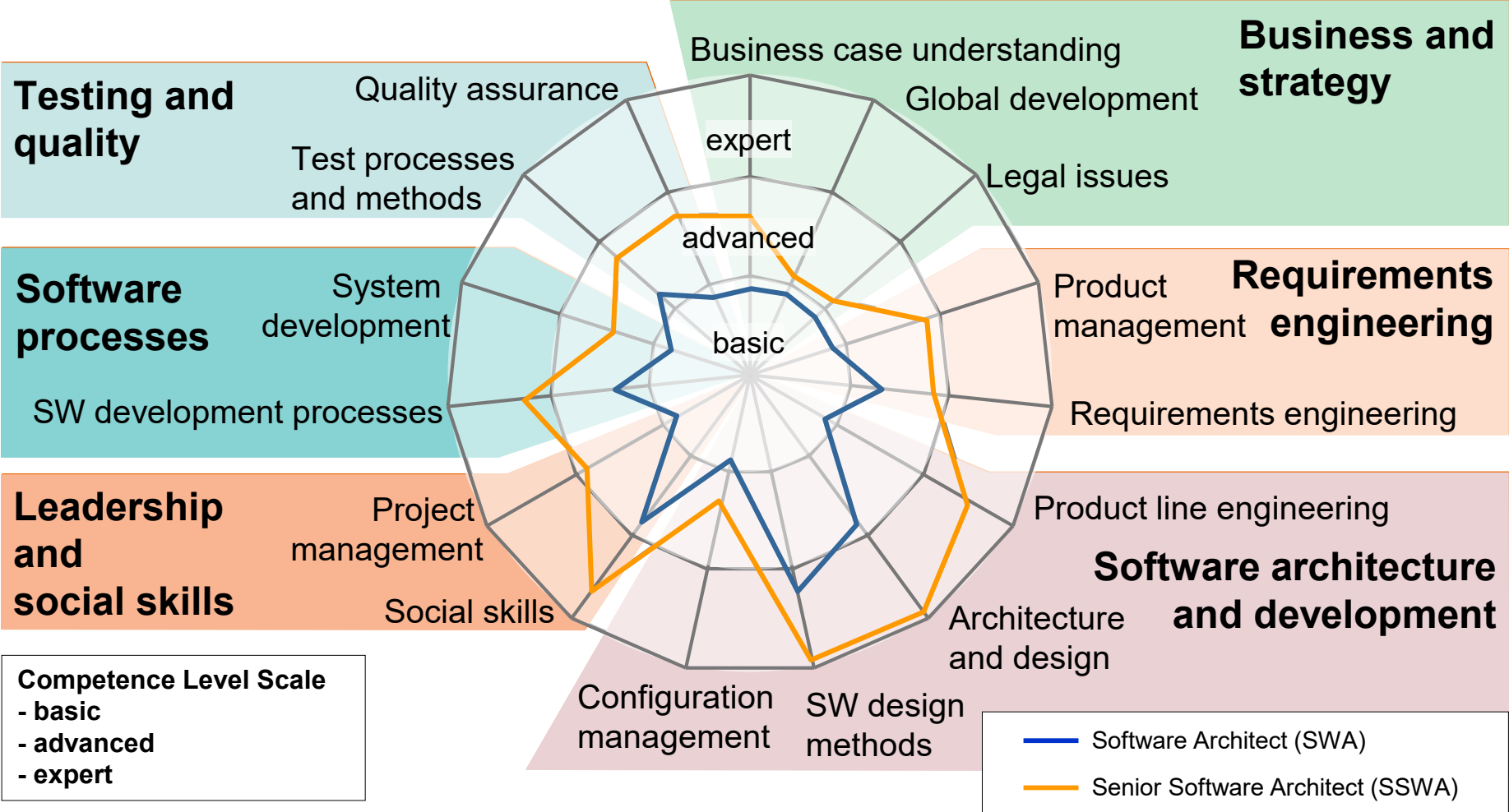
Architecture and “Living Bridges”



Source: Sanchit1504 (CC BY-SA 4.0)
https://commons.wikimedia.org/wiki/File:The_worlds_only_root_bridge.jpg

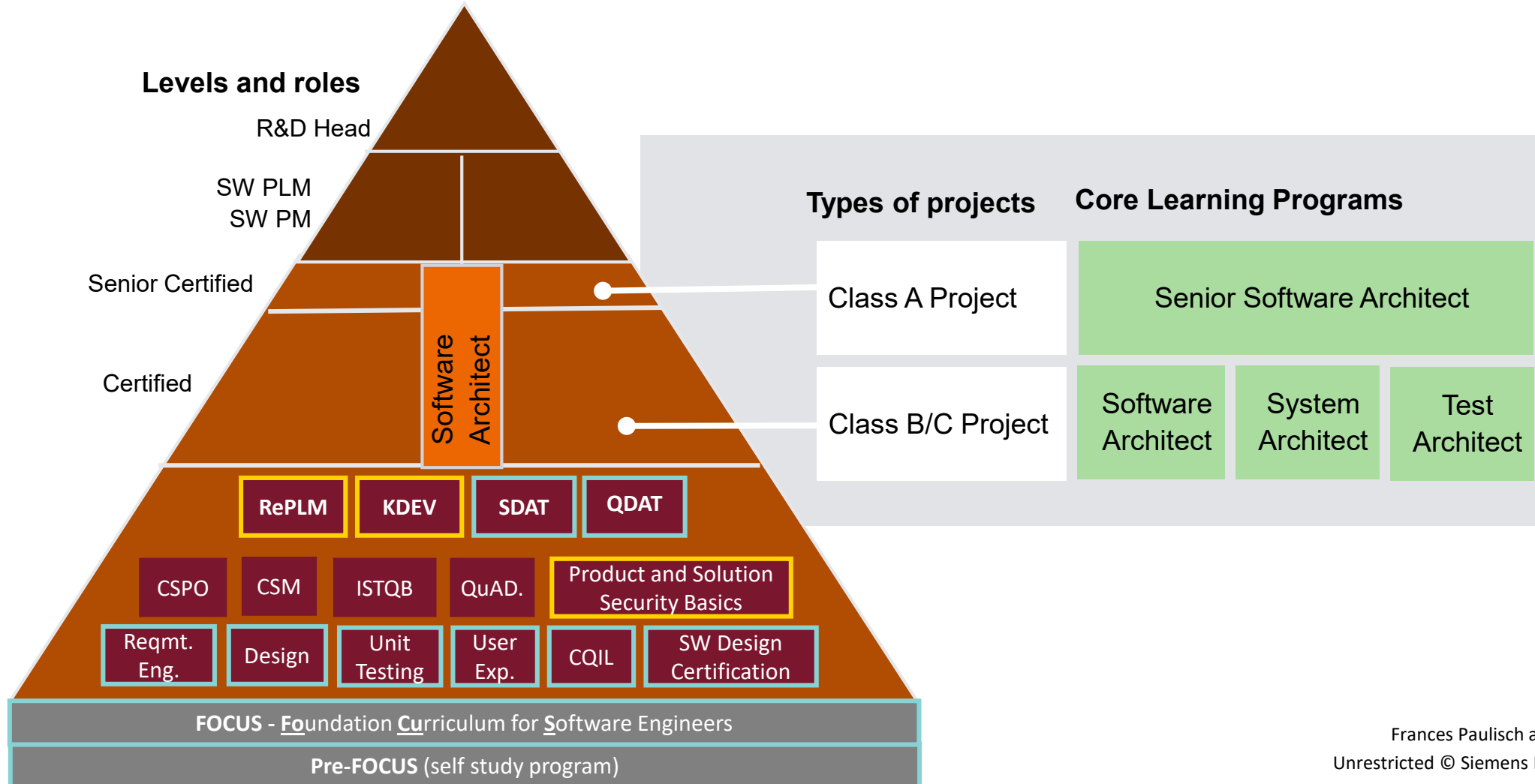


Software architects need a broad set of competencies...

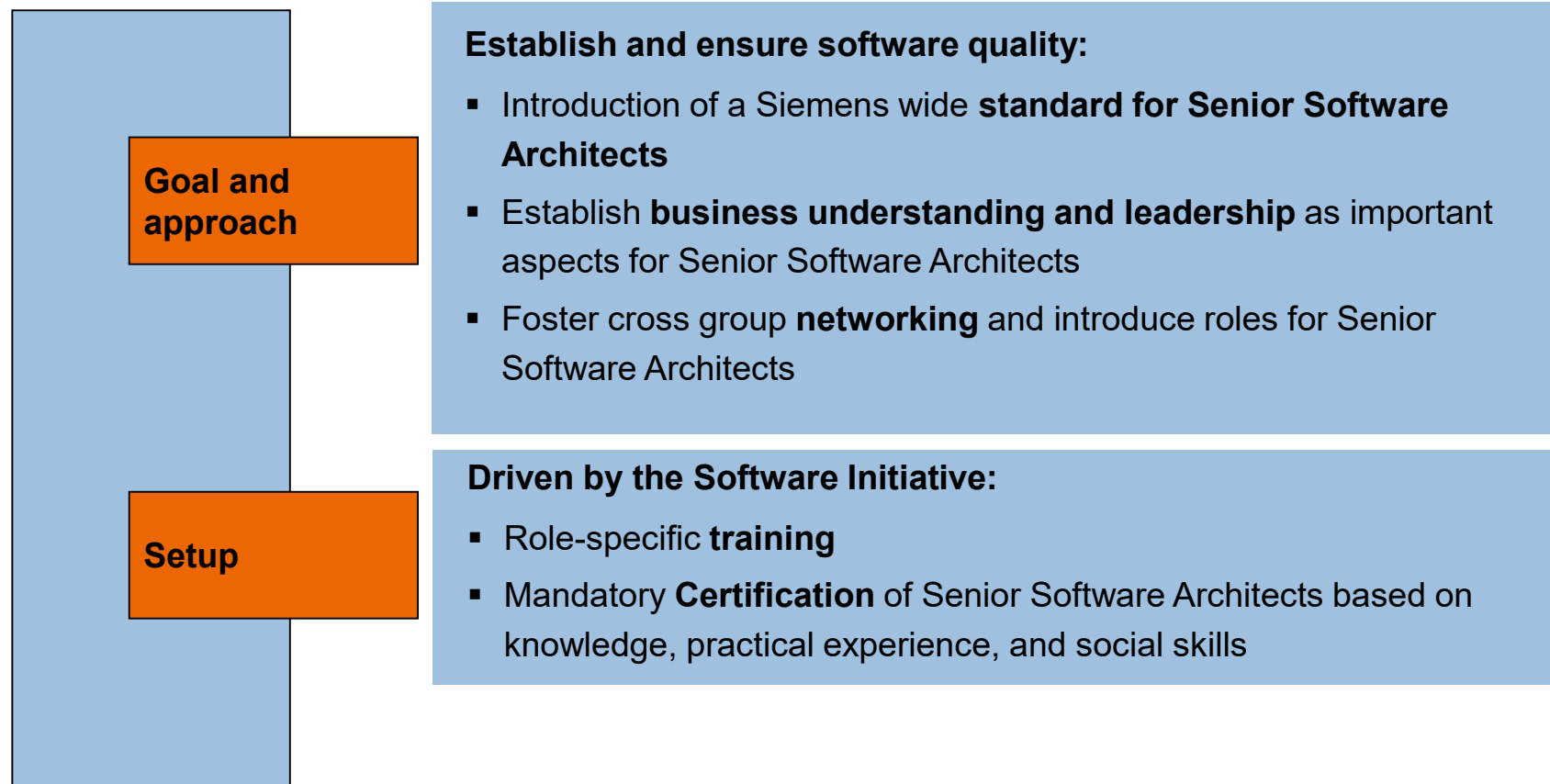


Software core learning programs – an important part of the training portfolio

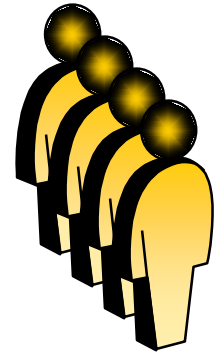
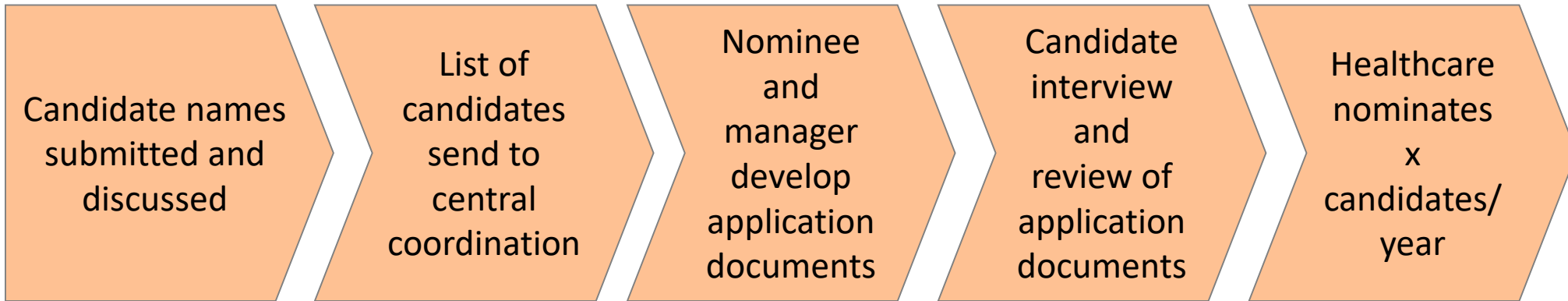
Core Learning Programs are important to drive software and system projects with technical as well as business and leadership competence:



Software Curriculum: Goal, approach and setup – Senior Software Architects



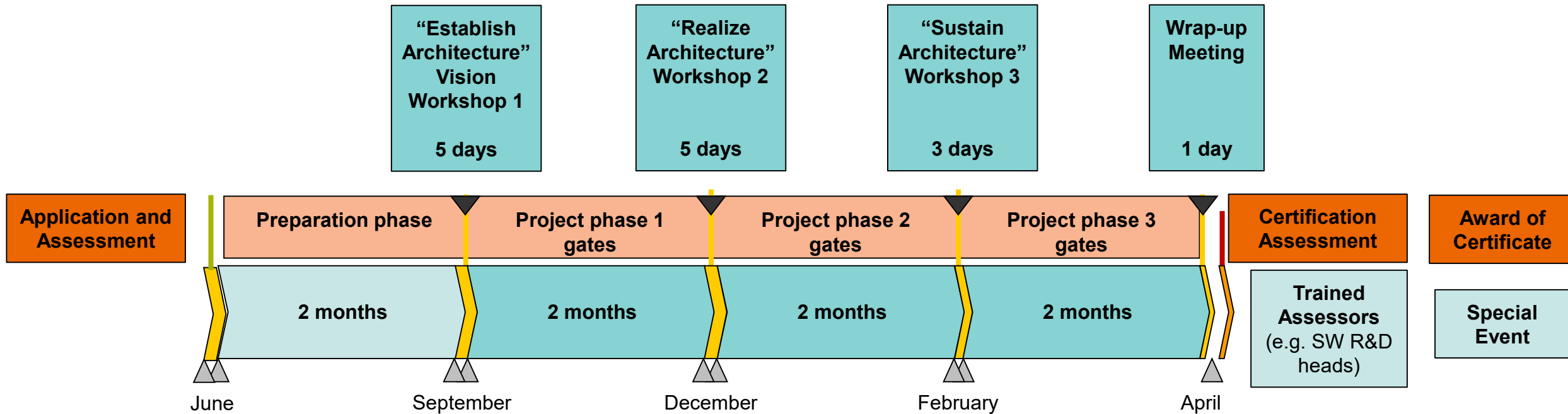
SSWA Candidate Selection Process @ Siemens Healthineers



List of nominees

- Candidate selection is part of the yearly performance and career development talks in all business lines
- HR compiles list of names and sends it to central coordination
- Central coordination works directly with nominee and manager on application documents
- Functional expert and HR interview candidates
- The top x candidates are nominated for the SSWA program
- Ranked list of candidates whose profiles best match the program's profile.

The certificate award “Certified SSWA” is the final step in the qualification process of Senior Software Architects



Coaching and Mentoring on current projects.

Participants create immediate value for their current during the program.

Qualification and certification process is embedded into yearly personnel performance/ development dialogue

Software Architect is a career path as key expert in this domain.

Internal

- Each run organizes a special events e.g. barcamp or hackathon
- Networking within disciplines across company or across disciplines within organization
- SSWAs mentor SWAs, SWAs mentor Key Developers,...
- Architects serve as assessors
- Architects involved in evolution of the content
- Cross-company architecture reviews

External e.g. publications/presentations

- ICSE 2010 paper (Paulisch/Zimmerer) on “A role-based qualification and certification program for software architects: an experience report from Siemens”
- SATURN 2012 presentation (Paulisch) on “Standardizing Speed and Security for Software-Based Systems”
- IEEE Software Pragmatic Architect column (Buschmann)
- SATURN 2016 presentation (Kreuter, Paulisch) on “How to Manage a Network of Software Architects Within Your Company”

SW Curriculum@Siemens Healthineers (SHS) Team



And many more active contributors
in this multi-disciplinary team:



Frances Paulisch, SHS DC
Jürgen Vaupel, SHS QT
Thomas Blum, SHS DI MR
Thomas Jachmann, SHS DI CT

Siegfried Wach, SHS DI SY
Dorothee Argus, SHS HR (not in photo)
Frank Buschmann, Siemens CT RDA
Matthias Backert, Siemens HR LE

Key success factors and takeaways messages

High quality content and training across the whole product lifecycle – establish common language.

Hands-on interactive training style – try out techniques – toolset and decision guidance.

Establish software architecture as career path.

Shift left – frontloading – choose the right candidates.

Well-established in organization – yearly employee review process, assessors from e.g. R&D manager

Holistic responsibility covering all relevant roles requires special focus on communication, social and leadership skills!

Thank you for your attention. Questions?

Siemens Healthineers

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