



SWEDSOFT

World Class Innovation, Research and Education in Sweden

Stefan Andersson, Chairman of Swedsoft
STEW Linköping 2016-10-13

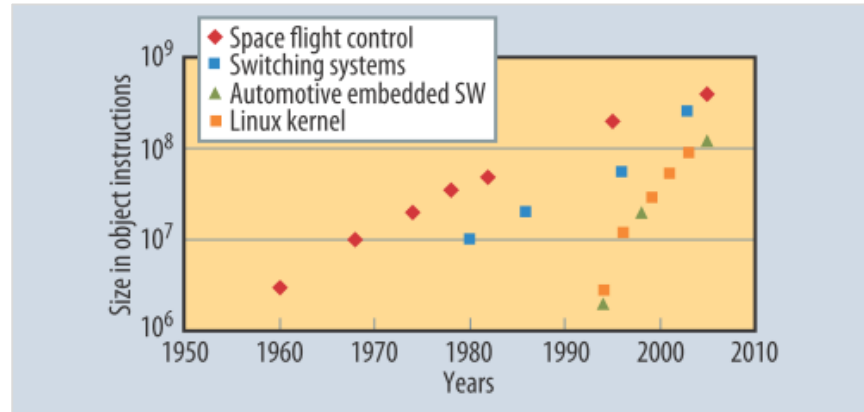
Outline

- **Trends and Challenges**
- Swedsoft's Mission
- The Future



More Software

- Larger software systems – in end-products as well as in the development environment
- Hardware becomes software
- Products become services
- Affects all industries – traditional industries such as automotive becomes "IT-companies"



Growth of embedded software: approx. 10 times in 7 years
C. Ebert; C. Jones (2009)



Need for New Competences

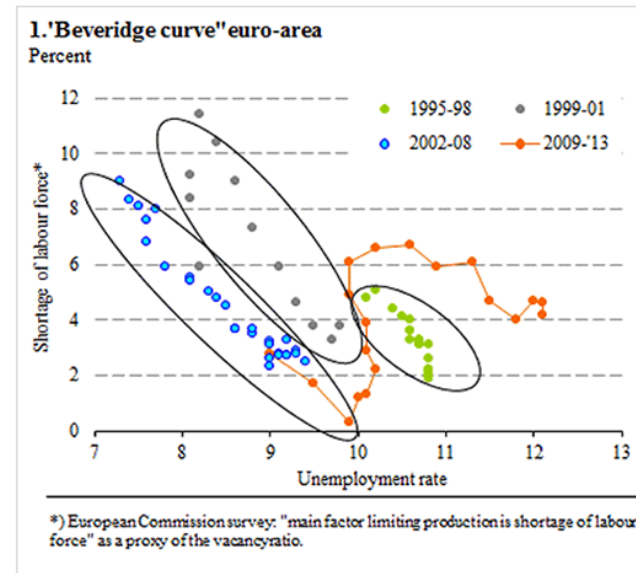
Number of employees in software and systems engineering +47% during 2005-2012

Anställda i Stockholms län 2012

Yrke



Increased unemployment AND Shortage of labor force



Source: SCB and Stockholm Chamber of Commerce

Source: European Commission



Increased System Complexity



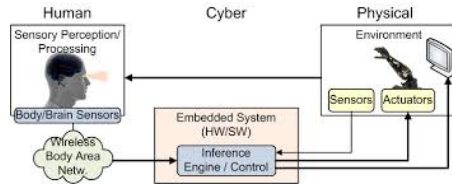
System of services
Cloud



Internet-of-Things and
People
Across domains

Need to consider the design
chain from chip to cloud in order
to "prove" certain system
characteristics such as:

- Resilience
- Efficiency and performance
- Safety and Security

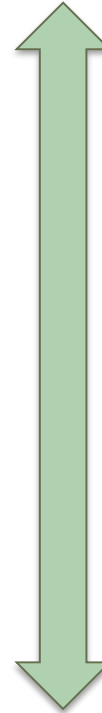


Embedded Systems
Cyber-Physical Systems

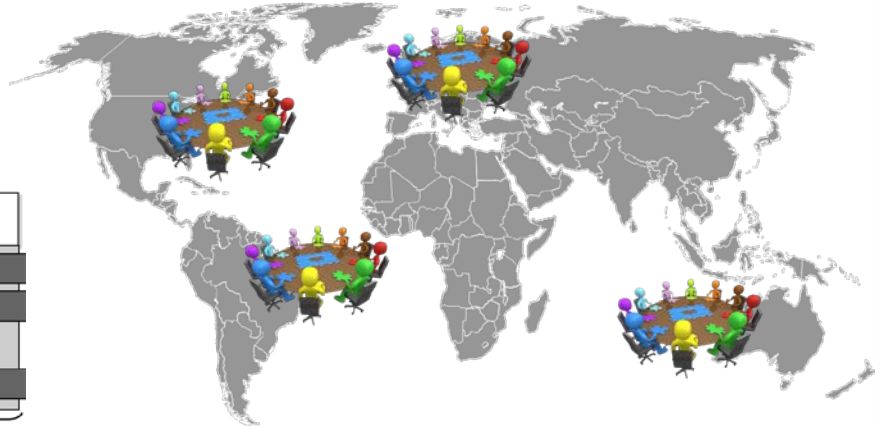
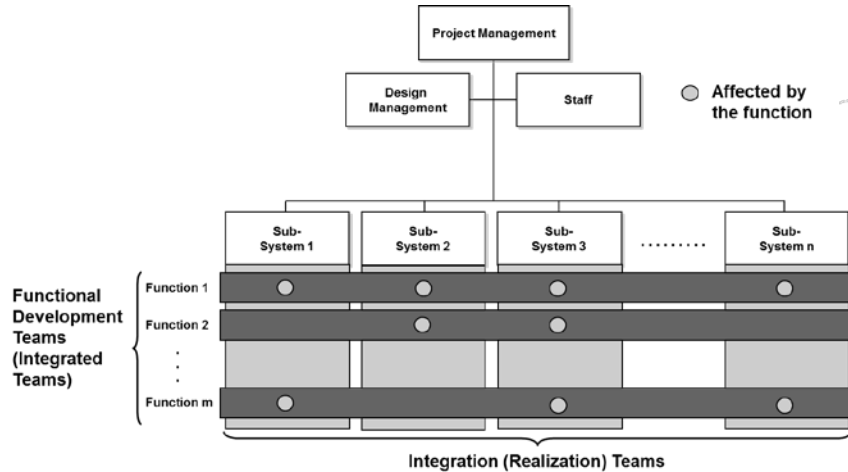
```
public class TcpClientExample
{
    public static void Main()
    {
        byte[] data = new byte[1024];
        TcpClient client = new TcpClient("127.0.0.1", 8080);
        client.Receive(data);
        Console.WriteLine("Received: {0}", data);
    }
}
public class TcpServerExample
{
    public static void Main()
    {
        TcpListener listener = new TcpListener(IPAddress.Loopback, 8080);
        listener.Start();
        Console.WriteLine("Listening on {0}", listener.LocalEndpoint);
        while (true)
        {
            TcpClient client = listener.AcceptTcpClient();
            Console.WriteLine("Accepted connection from {0}", client.RemoteEndpoint);
            byte[] data = new byte[1024];
            client.Receive(data);
            Console.WriteLine("Received: {0}", data);
        }
    }
}
```



Computer Program
Hardware Components



More Complex Organizations



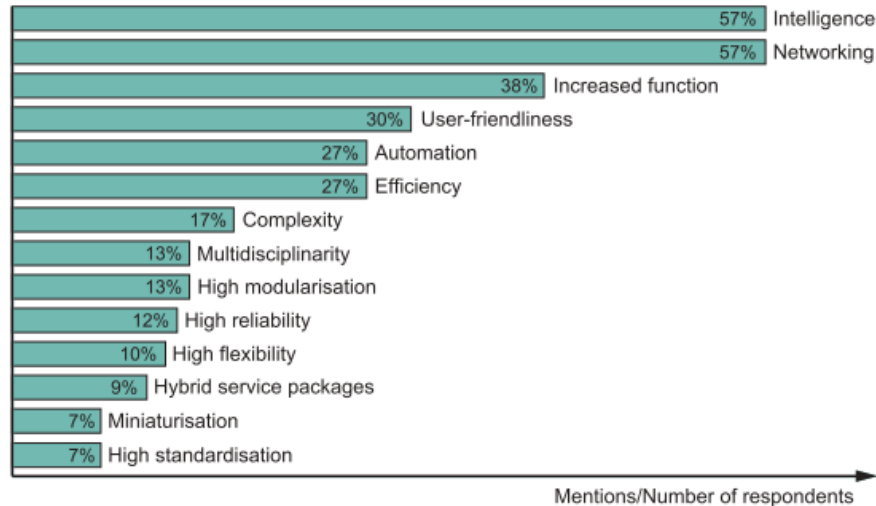
- **Cross-functional Team**
- **Multiple aspects/concerns**
- **Dynamic structures**

- **Distributed Teams**
- **Multiple Cultures**



Interconnected Smart Systems

Characteristics of future products



*“Systems Engineering in Industrial Practice” (Paderborn, 2015)
Heinz Nixdorf Institute, University of Paderborn, Fraunhofer Institute
for Production Technology IPT, UNITY AG*

Functions

- Artificial Intelligence
- Adaptive / Learning systems
- Handling Big Data

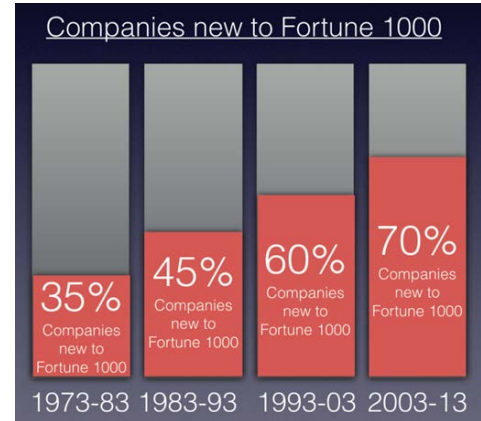
Co-operation

- Man-Machine
- Machine-machine



A More Dynamic World

- More companies act globally
 - New players in all industries
 - New threats and opportunities
- Need for faster and more agile companies
 - Continuous renewal
 - Exploit changes instead of handling them
 - Learn from customers and users
 - Embrace innovation as part of everyday life



Rate of change among the 1000 largest American companies, ranked by revenues.



Competitive AND Attractive

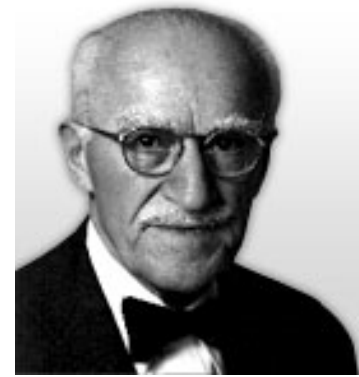
Need for **competitiveness** in all aspects:

- **Design** – Aesthetics, User Experience
- **Quality** – Usability, Performance, Reliability,...
- **Speed** – Lead time, Time-to-market
- **Cost** – Affordability, Life-cycle Cost

This drives the need for collaboration and thus to be **attractive** for partnership (win-win).



QUALITY



Joseph Juran, 1904-2008

The characteristics of a product or service that bear on its ability to satisfy stated or implied needs;
A product or service free of deficiencies.

ASQ, American Society for Quality



WHY IS QUALITY IMPORTANT?

Human safety

- Risk for injuries or death either due to failures

Security

- The protection of personnel and assets from threats.
- Threats are the potential for abuse of protected data, communication channels or devices

Mission Reliability

- Probability of function or mission success

Example of other consequences of poor quality

- Environment - Unintended pollution
- Economical - Bank services, stock market failures
- Legal - Failure leading to breaking export control laws
- Trust - Failures leading to mistrust and a weaker brand

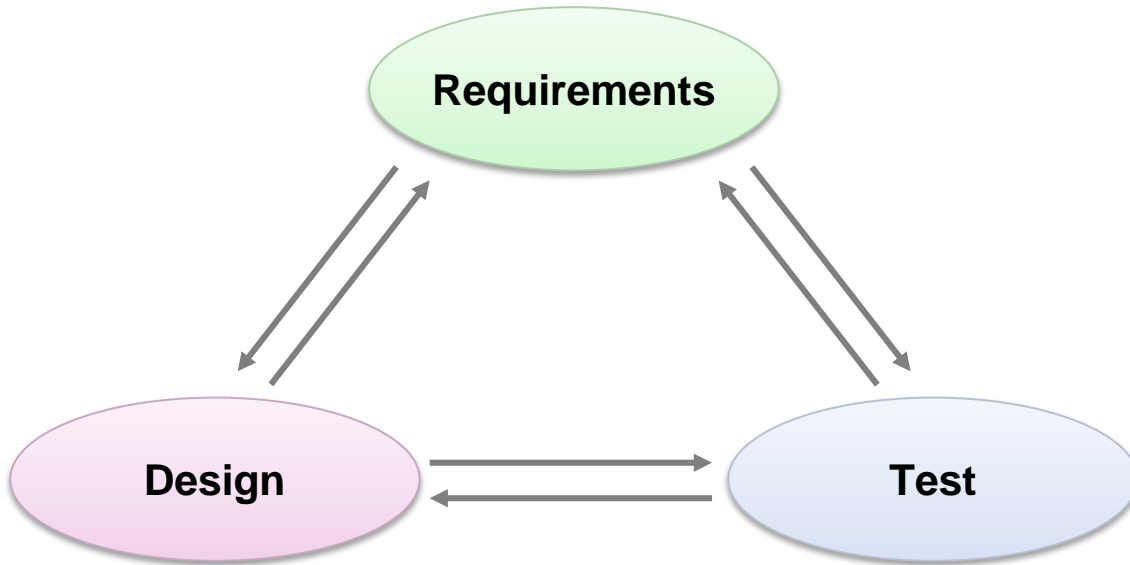
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Citation	Zivich, Michael, and Robert K. Cunningham. "The Real Cost of Software Errors." <i>IEEE Security & Privacy Magazine</i> 7.2 (2009): 87-90. © 2012 IEEE
As Published	http://dx.doi.org/10.1109/MSP.2009.56
Publisher	Institute of Electrical and Electronics Engineers (IEEE)
Version	Final published version
Accessed	Sat Nov 07 10:38:30 EST 2015
Citable Link	http://hdl.handle.net/1721.1/74667
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The Real Cost of Software Errors
(IEEE Security & Privacy Magazine
7.2 (2009): 87-90)

QUALITY ASSURANCE



Outline

- Trends and Challenges
- **Swedsoft's Mission**
- The Future



Mission Statement

- **Swedsoft** works to strengthen Sweden as an internationally recognized *research* and *innovation* centre regarding software intensive systems and thus contribute to national growth and welfare.
- **Made in Sweden** - Swedish-developed software shall, in the international competition be considered as innovative, of high quality and cost efficient.

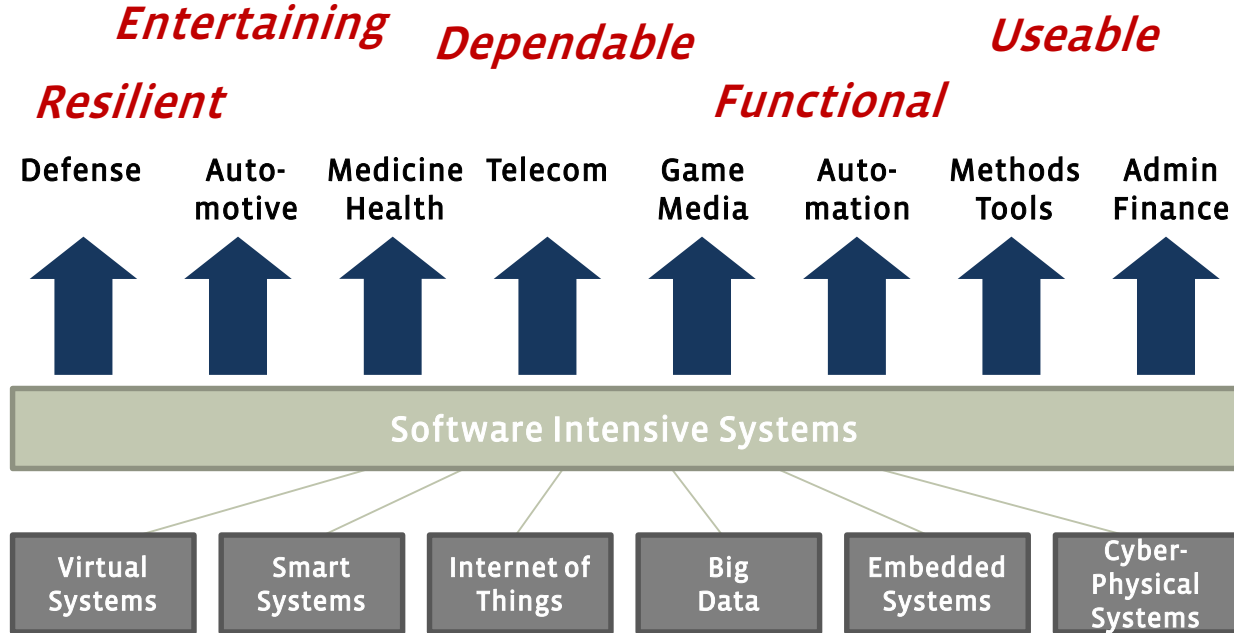


Scope / Focus Areas

- ***Software Systems Engineering***
- ***Computer Science / Software Technology***
- ***Leadership and Organization***



Swedsoft Promotes Systems Thinking in Software Development



Swedsoft Promotes Innovation in all Aspects

Product

New features, new architectures, e.g. cloud technology

Process

New processes and methods, e.g. agile methods

Business

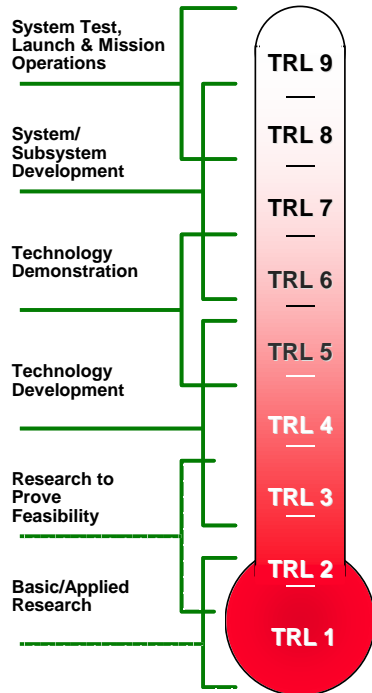
Business model innovation, e.g. software as a service, open source

Organization

New organizational models, e.g. innovation eco systems



Swedsoft influences Research Strategies and Research Calls



Goals

- **Innovations and Swedish industrial competitiveness** is world class
- **Swedish research** in Software is highly ranked, quoted and used
- **Swedish education** in software, from primary to higher university education, and support for lifelong learning, is an international role model



Values

Swedsoft's values, **Bold, Inspiring, Trustworthy**, mean that:

- We are open to collaborations and to new ideas
- We are actively engaged in Swedsoft's activities
- We deliver results





Members

Strategy

- Good mix
- Active members

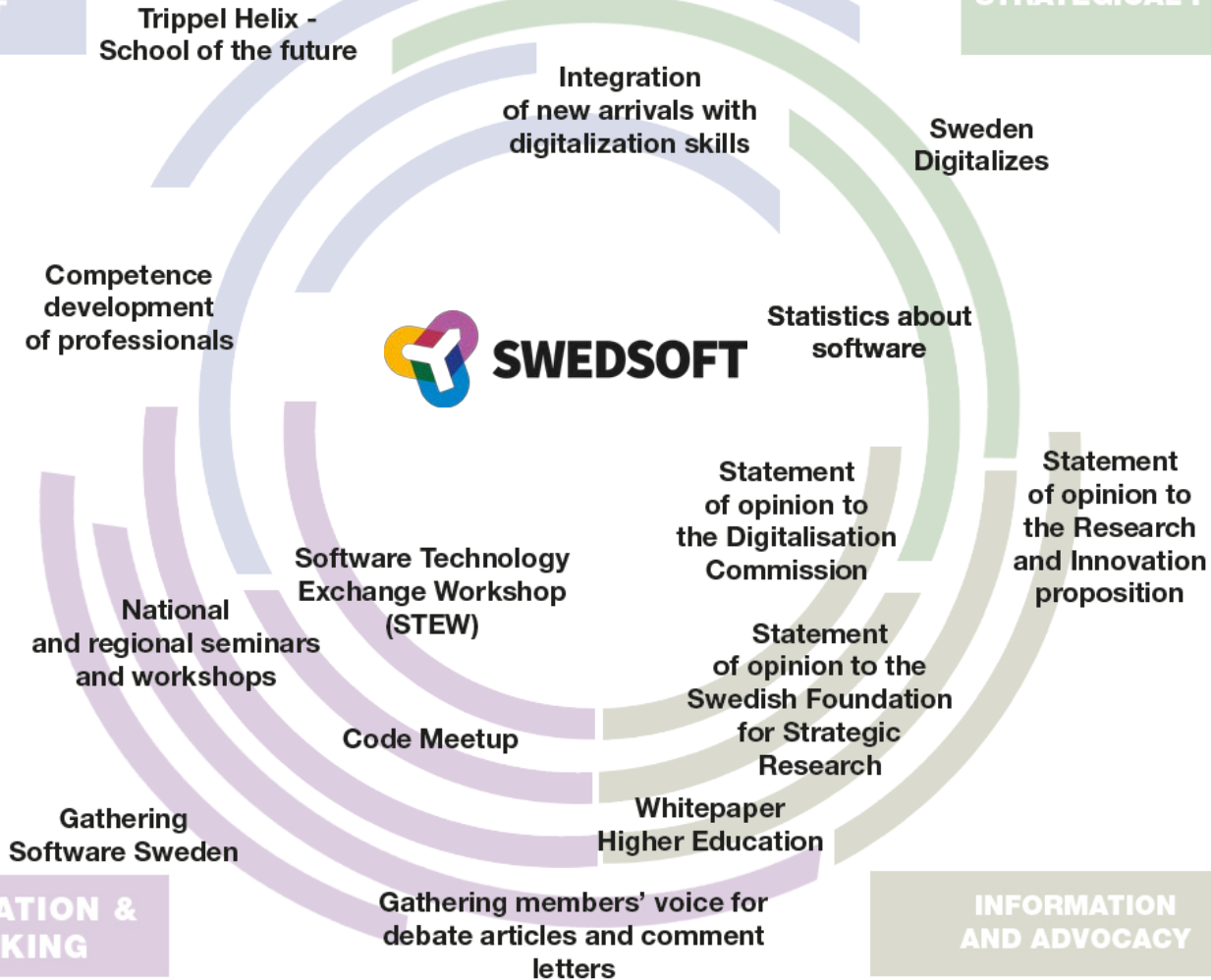
Values

- Bold
- Trustworthiness
- Inspiring



**EDUCATION AND
DEVELOPMENT OF
COMPETENCE**

STRATEGICAL PROJECTS



**COLLABORATION &
NETWORKING**

**INFORMATION
AND ADVOCACY**



Outline

- Trends and Challenges
- Why Swedsoft?
- **The Future**



The Future – Software Systems

- Design for Safety, Security and Resilience
- Model-based Systems Engineering - better than hand coding
- Correct by design and Formal Verification
- Verification of self learning and adaptive (smart) systems
- Automation (Design, Test, Production) in Software Development
- Efficiency and high quality at the same time
- Design, Acquisition and Use of large software systems in the public domain



The Future – Swedsoft

- Continue to contribute to better education (Trippel Helix etc)
- Continue to contribute to integration of immigrants (UDI)
- Initiate project to provide facts and figures about software in Sweden
- Contribute to thriving research and industry clusters in all regions of Sweden (South, West, East, Mid and North)
- Lobbying for Life Long learning and Swedish Research
- Continue with networking activities
- Recruit and involve more members



We need more people to be active in Swedsoft

- Initiate a new projects
- Get engaged in a current projects
- Be a part of the STEW working group
- Host and arrange a Swedsoft event
- Be a promoter of Swedsoft's mission

...or is there something else you want to do?

Tell us! Contact us...



www.template.net



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SWEDSOFT

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