Ultra-Large-Scale-Systems Development Challenges at Siemens

Dan Paulish, Ph.D.
Siemens Corporate Research, Inc.
Princeton, NJ 08540
daniel.paulish@siemens.com
Phone +1 (609) 734-6579
Siemens has a long tradition of technological innovations.
The rate of innovations is increasing.

Share of sales with products...

- ... 5 years and younger
- ... 6 to 10 years old
- ... more than 10 years old

<table>
<thead>
<tr>
<th>Year</th>
<th>5 years and younger</th>
<th>6 to 10 years old</th>
<th>more than 10 years old</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>48%</td>
<td>30%</td>
<td>22%</td>
</tr>
<tr>
<td>1985</td>
<td>55%</td>
<td>29%</td>
<td>16%</td>
</tr>
<tr>
<td>2005</td>
<td>75%</td>
<td>19%</td>
<td>6%</td>
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</tbody>
</table>
Siemens is one of the world’s largest software companies.

► Siemens has more than 30,000 software developers.
► 60% of Siemens’ business is based on software.
► Siemens spends more than 3 billion euros per year on software development.
But, Siemens is not recognized as a software company, since most of our software is embedded.

Examples:

- Automation devices
- Industrial control systems
- Automotive components
- Communication systems
- Rail systems
- Medical devices
For Example... Automotive

Chassis & Car body
Fleet Management
Infotainment
Interior
Marine Solutions
Special OEM Solutions
Power Train
Public Transport Solutions
Replacement Parts

![Car Image]

Automotive Embedded Software Lines of Code

<table>
<thead>
<tr>
<th>Model Year</th>
<th>Lines of Code (Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>5</td>
</tr>
<tr>
<td>2008</td>
<td>10</td>
</tr>
<tr>
<td>2009</td>
<td>15</td>
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<tr>
<td>2010</td>
<td>20</td>
</tr>
<tr>
<td>2011</td>
<td>25</td>
</tr>
<tr>
<td>2012</td>
<td>30</td>
</tr>
<tr>
<td>2013</td>
<td>50</td>
</tr>
</tbody>
</table>
Software Engineering Challenges at Siemens

§ Functionality previously realized in electrical or electro-mechanical systems is now being realized in software => bigger, more complex, & more software projects (hundreds of developers, millions of lines of code).

§ Meeting functional and non-functional requirements is important to business success => restricted hardware resources, real-time performance, safety critical applications.

§ Multisite development projects.

§ High quality (i.e., thoroughly tested, reliable) software is important to business success.

Our software systems engineering methods and technologies must address the increasing scale and complexity of emerging software systems.
Thank you!

Contact:
Dan Paulish
Distinguished Member of Technical Staff
daniel.paulish@siemens.com
Phone +1 (609) 734-6579