

# SWELL - National Research School in Software Verification & Validation

20091202, Vinnova, Stockholm

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The logo for SWELL, featuring the word "SWELL" in a bold, sans-serif font. The letter "W" is stylized with an orange-to-white gradient. The logo is set against a dark blue background with a subtle grid pattern.

**SWELL**

# Industry needs

- ❖ Verification & Validation: Large Focus for ABB
  - ❖ becoming a Software company
  - ❖ focus on V&V, Quality, Customer Satisfaction
- ❖ Efficient Verification & Validation Methods
  - ❖ Efficient ways of integrating into a system
- ❖ Learning opportunities from
  - ❖ other companies
  - ❖ research, both empirical research but also directly help with methods and tool selection

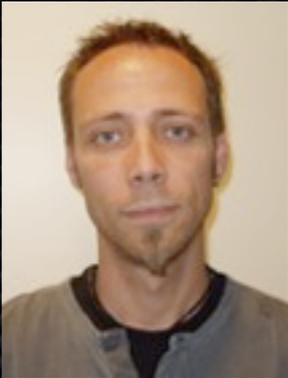


# Goals for SWELL

- ✦ More PhD's (G1)
  - ✦ of International top class (G2) with
  - ✦ innovation & entrepreneurial knowledge in V&V (G3)
- ✦ Close contacts and exchange:
  - ✦ industry <-> academia (G4) &
  - ✦ industry <-> industry (G5)
  - ✦ Swedish innovation env. <-> Internationally best (G6)



Robustness



Active Safety



Automated Acc. Testing



Component-based



Agile



MdH, Västerås

Security

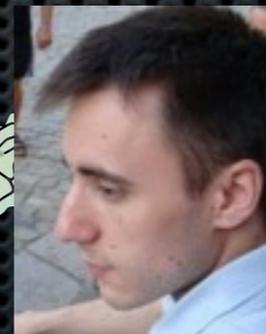
Search-based

Req<->Test

Regression Req<->Test

ITUniv & CTH, Göteborg

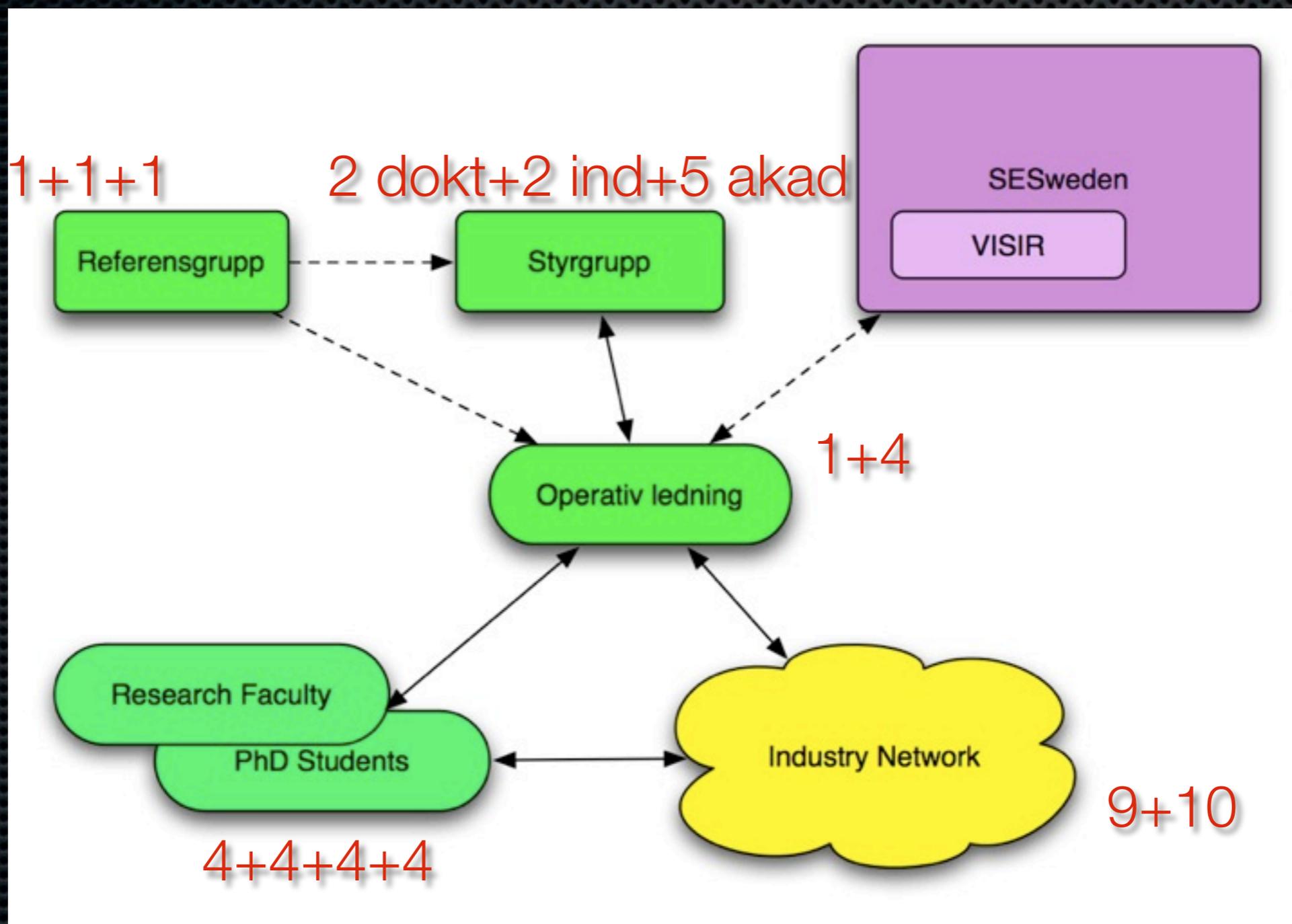
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LTH, Lund

BTH, Ronneby

# Organization

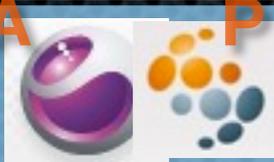
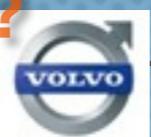


# SWELL Scale for Industry Involvement

#	Type	Description
7	Collaboration	Employed by company
6		Office at company
5		Recurrent visits
4		Several visits
3	Exchange	Data collection
2	Visit	(One) Visit & discussions
1		Presentation
0	Contact	Initial

Modifiers: **P** Co-published    **A** Co-applicant    **?** Planned collab

# Collaboration with Industry

#									9	10
7										
6										
5										
4										
3										
2										
1										
0										

# Courses



SWELL “Glue” Course: CIV (Creativity and Innovation in SW V&V) ...

PropTest

PropTest

AutoV&V

AutoV&V

SafetyV&V

Processes

From Research to Business

# Mobility Abroad

- ✦ Stefan Björnander visited Swinburne University (AU) for 4 months during early 2009
- ✦ Wasif Afzal will visit King's College (UK) for 3 months during 2010
- ✦ Lessons learned:
  - ✦ Too early go abroad before licentiate
  - ✦ Industry PhDs can mostly go within their company
  - ✦ Bring top professors to SWELL instead (Summer school and as visitors)

# Self-eval

- \* Created lots more contact with industry
  - \* Companies are more positive than expected and contributes
  - \* Most PhD students have clear company connection
- \* A national approach is unique within our area
- \* Promoted more collaboration among research groups
- \* Startup phase taken longer than planned
- \* Lack of flexibility in budget
- \* Not enough that there are money and ideas - students must want to take part and fit their projects
- \* Too dependent on few persons - how spread and involve

# Self-eval: Industry



- \* Very good environment & energy
  - \* The software research V&V elite in Sweden
  - \* Many companies interested
- \* Industry day within courses and as workshop(s)
- \* Feedback on research plans
- \* More direct cooperation with PhDs and PhD students
- \* Communication of research results to companies

# Plans for next phase

- ✦ Extend to 14-16 PhD students
- ✦ Send senior PhD's on visits abroad
- ✦ Involve international professors in summer schools
- ✦ Industry/Innovation Workshops with wider invitations
- ✦ Establish courses, course formats & industry participation
- ✦ Decide on long-term funding strategy
- ✦ Establish Master Thesis price (funding secured)
- ✦ International and National Marketing
- ✦ Process for Consultant company involvement

# Backup Slides

# SWELL PhD Students

NR	DOKTORAND	START	LIC	APPLICANTS	GU
1	Emelie Engström, LTH	06-08-01	March 2010 (Plan)	19	KTH
2	Ali Shahrokni, Chalmers	07-05-01	April 2010 (Plan)	15	
3	Dejan Baca, BTH	07-07-01	Lic April 2009	N/A	
4	Wasif Afzal, BTH	07-11-01	Lic June 2009	7	
5	Stefan Björnander, MdH	07-11-15	April 2010 (Plan)	6	Umeå
6	Niklas Mellegård, IT Univ	08-01-01	2010 (Plan)	27	Ej ITU men var?
7	Adnan Causevic, MdH	08-02-26	2010 (Plan)	5	Sarajevo
8	Michael Unterkalmsteiner, BTH	09-01-01	2011 (Plan)	30	Bolzano
9	NN 1, LTH	09-12-01	2012 (Plan)	50	N/A
10	NN 2, Chalmers	10-02-01	2012 (Plan)	N/A	N/A

# Steering group

ROLL	PERSON
Industrirepresentant	Lars-Ola Damm, Ericsson AB
Industrirepresentant	Thomas Thelin, ABB Malmö AB
Projektledare	Robert Feldt, BTH
Doktorand	Emelie Engström, LTH
Doktorand	Stefan Björnander, MdH
Nodledare LTH	Per Runeson, LTH
Nodledare MdH	Daniel Sundmark / Kristina Lundqvist, MdH
Nodledare Chalmers/ITUniv	Thomas Arts, Chalmers
Nodledare BTH	Richard Torkar, BTH

# Published papers

TYP AV PAPPER	ANTAL
Där doktorand är en av författarna (D)	26
- varav med industripart (DI)	5
- varav med extern part (DE)	4
- varav med part från samma lärosäte men ej inom skolan (DL)	12
Där ej doktorand men senior är en av författarna (S)	20
- varav med industripart (SI)	4
- varav med extern part (SE)	3
- varav med part från samma lärosäte men ej inom skolan (SL)	18

# Economy

AKTIVITET	BUDGET	I 2 / I 0	I / 4
Forskarstudieplan	110	110	40
Advisory committees	115	0	15
IT-stödssystem för doktorandprocess	70	30	20
PR och info	100	120	30
Utv. V&V-kurser	350	150	150
Besök o rapporter V&V-kurser	200	0	60
Kitt-kurs	110	110	50
Resor och uppehälle doktorander för kurser	350	100	50
Sommarskola och innovation workshops	240	100	60
Resor och uppehälle för deltagande i sommarskola	230	60	0
Referensgrupp	80	0	45
Resor ledningsgrupper för möten och utbyte	160	30	0
Extern doktorandfinansiering gemensamt	115	0	0
Oförutsedda utgifter	165	25	0
Doktorander gästforskar utomlands	330	0	0
Påslag på lönekostnader ovan	264	122	70
SUMMA	2989	898	530

# SWELL Study plan

- ✦ PhD's have normal/local study plan + Swell plan
- ✦ SWELL PhD student =
  - ✦ PhD student at swedish university +
  - ✦ Accepted by SWELL steering group
- ✦ Req: "Thesis subject ... has **strong connection to SW V&V**"

# SWELL Study plan (2)

- ✦ Goals with research studies in SWELL:
  - ✦ “broad knowledge in the whole area of sw v&v that covers the state-of-the-art”
  - ✦ “knowledge about & training in creativity and innovation in research activities”
  - ✦ “knowledge about & training in entrepreneurship & intrapreneurship”
  - ✦ “present V&V area and results for colleagues/laymen/industry”
  - ✦ “connections to international research & innovation networks”

# Benefits for PhD student

- ✦ Courses to broaden your knowledge
  - ✦ V&V + Innovation/Entrepreneurship + Communication
- ✦ Money to travel and accomodation for courses
  - ✦ Yearly allowance (connection to SWELL goals required!)
- ✦ Research visists abroad
- ✦ External feedback on project
  - ✦ Yearly SWELL review, External academic review, Industry review
- ✦ Contacts - Other PhDs, Other academics, Industry

# Reqs on PhD student

- ✦ Participates in SWELL events
- ✦ Participates in courses (V&V, Innovation/Entrepreneur, Communication)
- ✦ Communicates about project to industry
- ✦ Updates SWELL project on progress and news
- ✦ Updates plan yearly
- ✦ Plans for research visit abroad

# Courses

- ✦ BTH: Glue course SWELL, continuously from 09
- ✦ ITU: “Property-based testing”, ht09
- ✦ BTH: “Automated VoV/Test”, vt10
- ✦ MdH: “SE for high-integrity sys”, ht10
- ✦ LTH: “VoV Processes”, vt11

# SWELL Course template

- ✦ Title, Credit points & Formalia
- ✦ Objectives
- ✦ Industry needs and challenges addressed
- ✦ Contents
  - ✦ At least one element in connection to industry (presentation or evaluation/adaptation) + report on it
- ✦ Distance teaching and learning