



Product Line Engineering for NGO Projects

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Collaborative Development Group (Collab)



- Addresses the problem of distance in distributed workgroups
- Develops tools for virtual teams
 - with a special focus on the fields of collaborative / global / social software development
- People
 - 1 professor,
 - 2 senior research assistants
 - ~15 (MSc + BSc) final-year students per year
- Recent collaborations
 - Daniela Damian @Uvic
 - Distributed requirements engineering and CMC theories
 - Rafael Prikladnicki @PUCRS
 - Collaboration augmented with automatic translation
 - Darja Smite @BTH
 - Evidence-based cost-savings in GSE



Informativi Senza Frontiere (ISF)



- Italian NGO founded in 2005
 - 10 regional sections, 300+ members
 - Works on IT projects to fight digital divide
 - Emergencies
 - Marginalization
 - Difficulties
- in Italy and developing countries



A few ISF projects



sensOltre



Tactile art for the blind

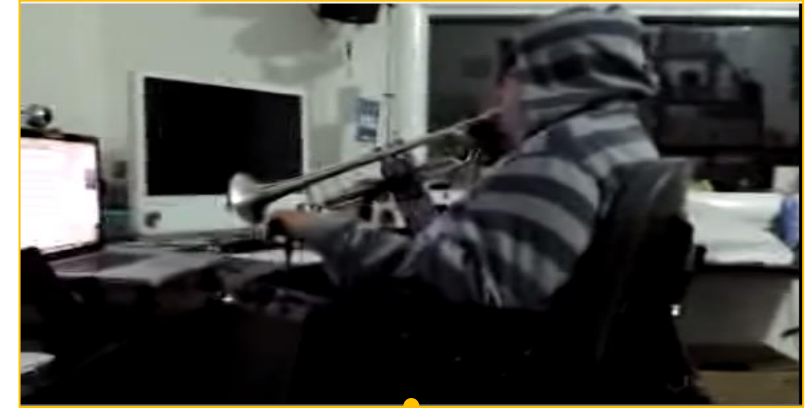
OS Hospital mgmt system
used in 14 development countries



OH Open Hospital



AccordiAbili



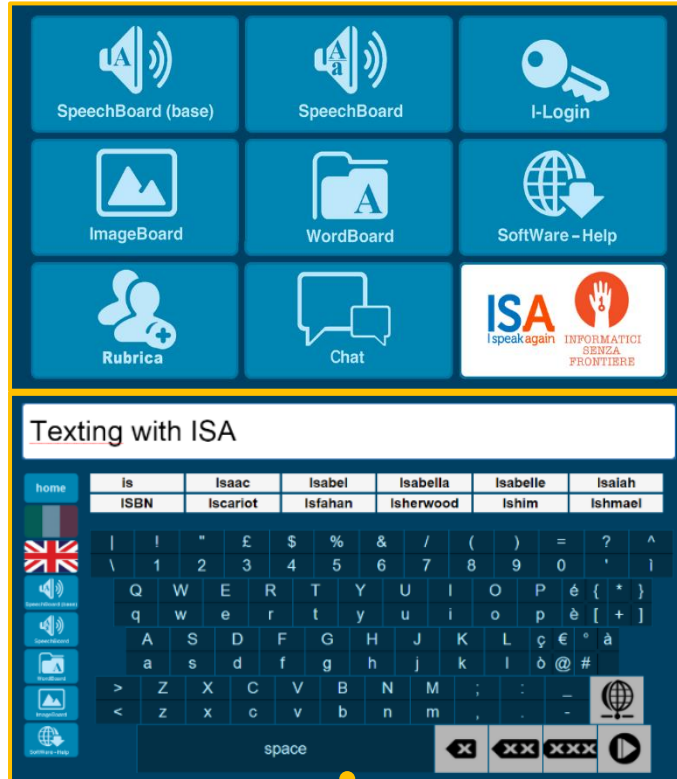
Musical instruments for
people with disabilities

ISF & Collab partnership

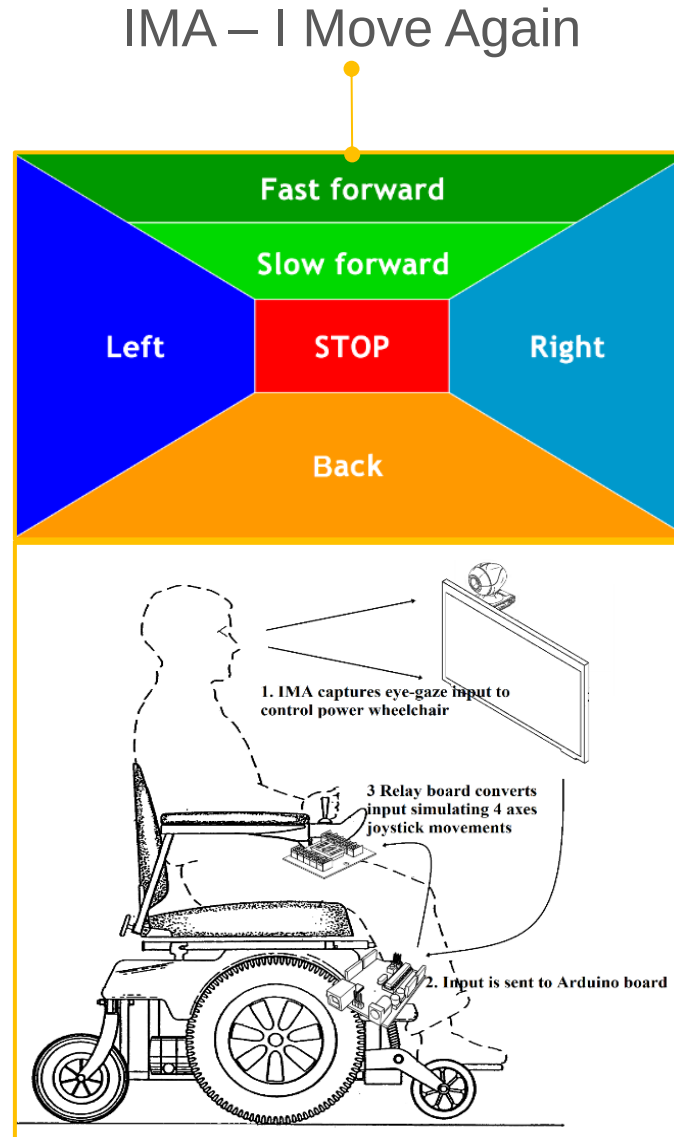


- Increase of the pool of volunteers to sustain existing and new projects
 - Students fully committed to projects for at least 3 to 6 months
- Development process improvement
 - Adopted an agile process with sprint planning and pull request-based code reviews
- Guidance in technology selection (Technical Board)
 - Suggest emerging technologies to improve existing solutions or address new problems

Three assistive technologies projects



ISA – I Speak Again



Paperboy (aka Strillone)

A few lessons learned



- Pick technologies among those mastered by ISF senior members
- Refactorings must be designed to be carried out by just one student
- ISF senior members prefer to coordinate no more than two students at the same time on the same project
- High variability in human performance holds for volunteering students too
 - divide project issues into *Urgent*, *Hard*, *Doable*
 - urgent work (e.g., hot fixes) always a senior member's responsibility

The problems with development at ISF



- Literally no or very limited budget for carrying out projects
- No financial incentives for developers
- Need to coordinate between geographically distributed contributors
- High turnover rate

How can we improve the development process while also increasing the sustainability?

- e.g., decrease of labor need

NGO projects as product lines



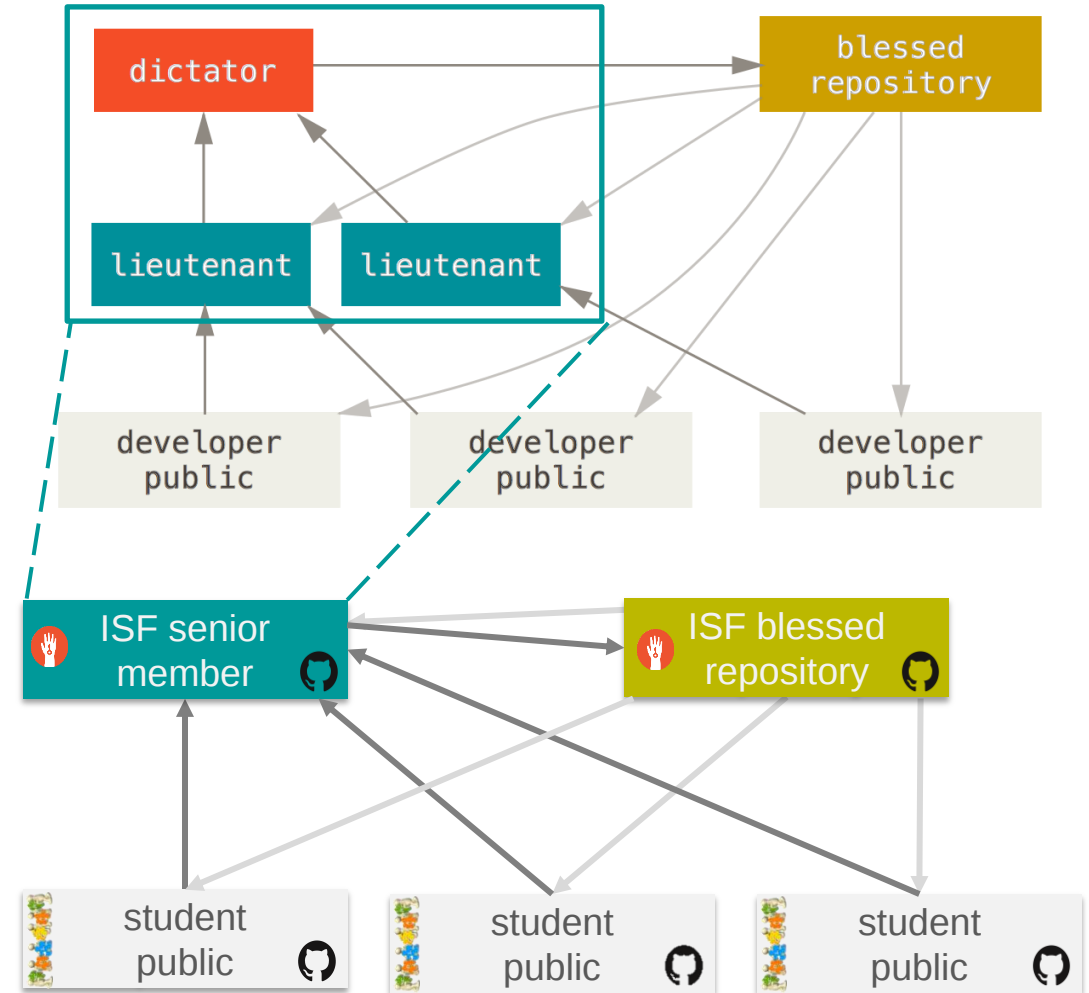
	Features	ISA	IMA
Core assets	Eye tracking	✓	✓
	UI dashboard	✓	✓
	DB access	✓	✓
	Networking	✓	✓
Variabilities	Virtual keyboard	✓	
	Messaging	✓	
	Power wheelchair control		✓
	Home automation		✓

- Setup an open-source SPL model
- ISA and IMA projects re-engineered into a family of related systems
- Only available resources:
 - Google for Nonprofits
 - GitHub for Nonprofits
 - Volunteers' time and goodwill

OS SPL: The case of Linux

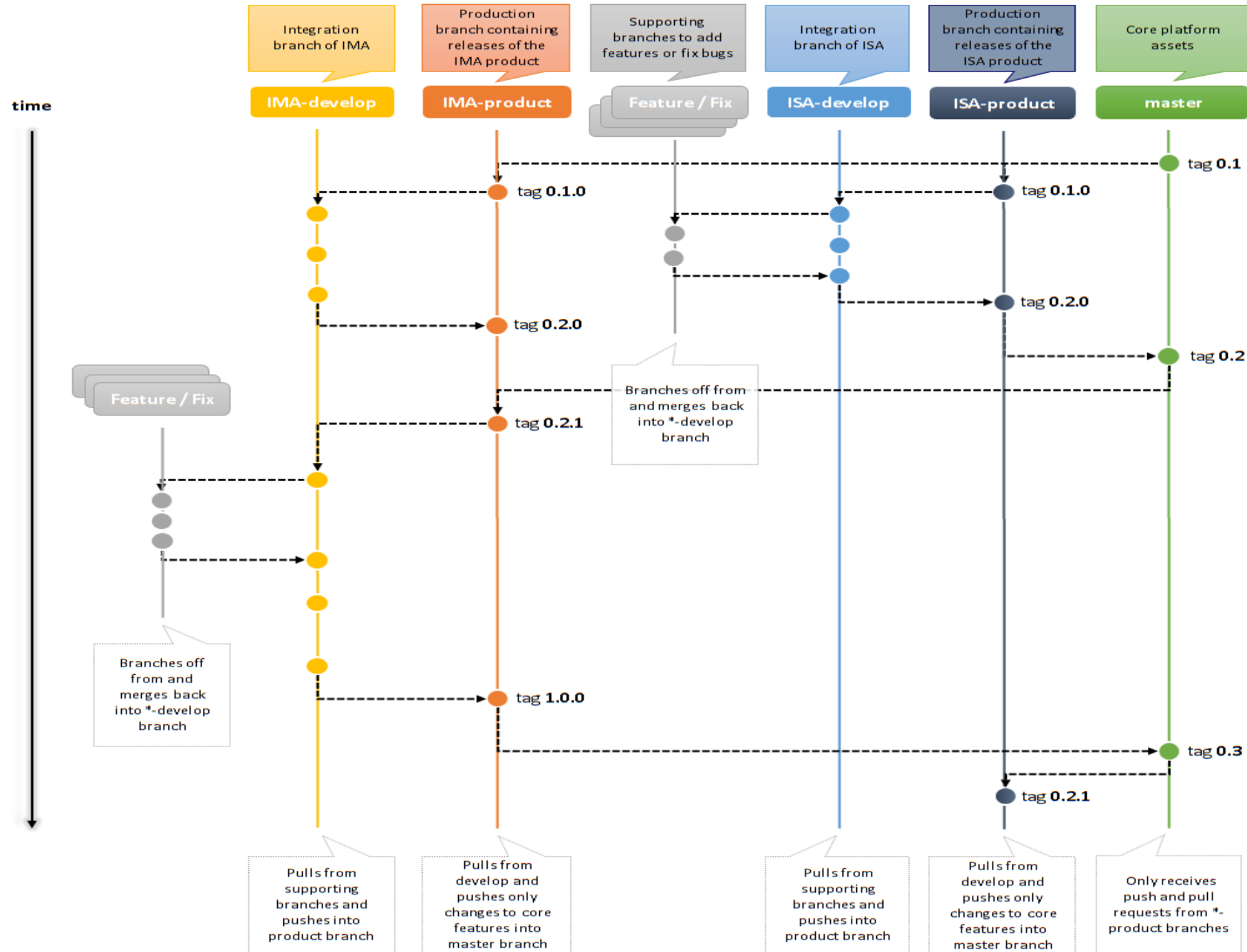


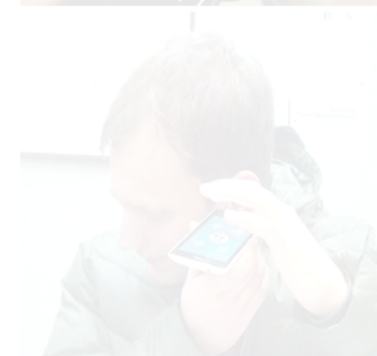
- Both Linux Kernel and distros seen as examples of OS SPLs
 - Kernel config and package-dependency languages are equivalent to variability models
- Lean infrastructure
 - No SPL ad-hoc solution, mostly email and git



Branching model

- Main branches
 - core
 - product
 - integration
- Supporting branches
 - feature
 - fix

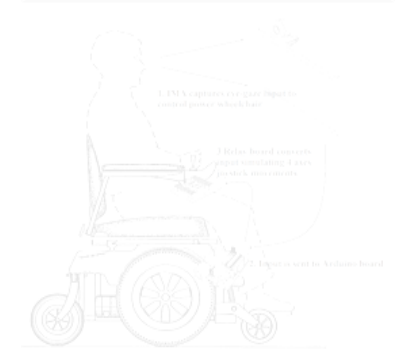
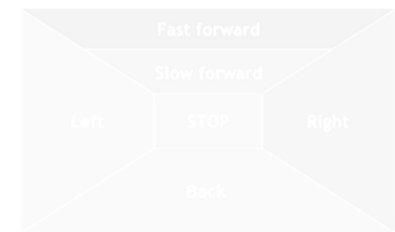
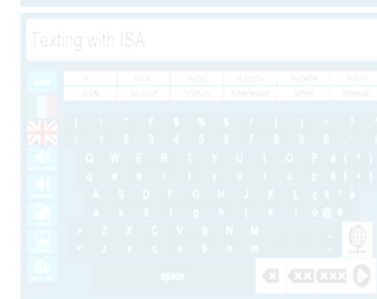
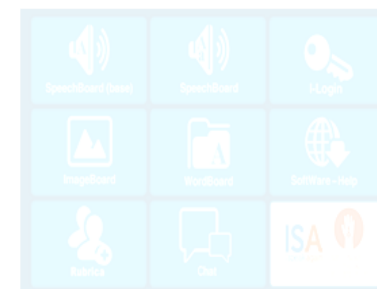




Questions?

THANKS!

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Core assets	Eye tracking	✓	✓
	Dashboard	✓	✓
	DB access	✓	✓
	Networking	✓	✓
Variabilities	Virtual keyboard	✓	
	Messaging	✓	
	Power wheelchair control		✓
	Home automation		✓



May I have your feedback?



- Is there a chance that PLE would be an overkill given the size of our projects?
- Is specific tool support just necessary for a successful SPL or can our lean infrastructure be enough?
- Which variability modelling technique would work best in our case?
- Can we deal with variability management mostly through repo branching?

ISA-IMA SPL

Pros

- + Increased productivity / quality
- + Decreased labor needs / costs

Cons

- Re-engineering effort steals resources from further development
- Lack of experience with PLE
- Strong commitment
- Need for adequate organizational structure, processes and tools
- ...