

Can Global Software Engineering and Service Oriented Architectures benefit from each other?



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Purpose of the talk

- To provide an overview on Global Software Development (GSD)
- To elaborate on how SOA can help GSD
- ... and on how GSD can help SOA
- To identify some research questions

Global Software Development

Definition

- GSD: software development work undertaken at **geographically separated locations** across national and organizational boundaries in a **coordinated fashion** involving real time (synchronous) and asynchronous interaction

Why?

- Achieve cost benefits
- Manage shortage in specific skills
- Need of customer proximity
- National legislations
- Flexible resource capacity
- Reduced time to market (work around the clock)
- Open source development

Why?

- ...crossing geographical and organizational boundaries



Different flavors of GSD

- Distributing work
 - within the same organization → offshoring
 - across organizations → outsourcing
- Partitioning work per phases
 - Delegating testing
 - Delegating maintenance
 - Delegating customization
- Distributed development
- Open source development

Open challenges

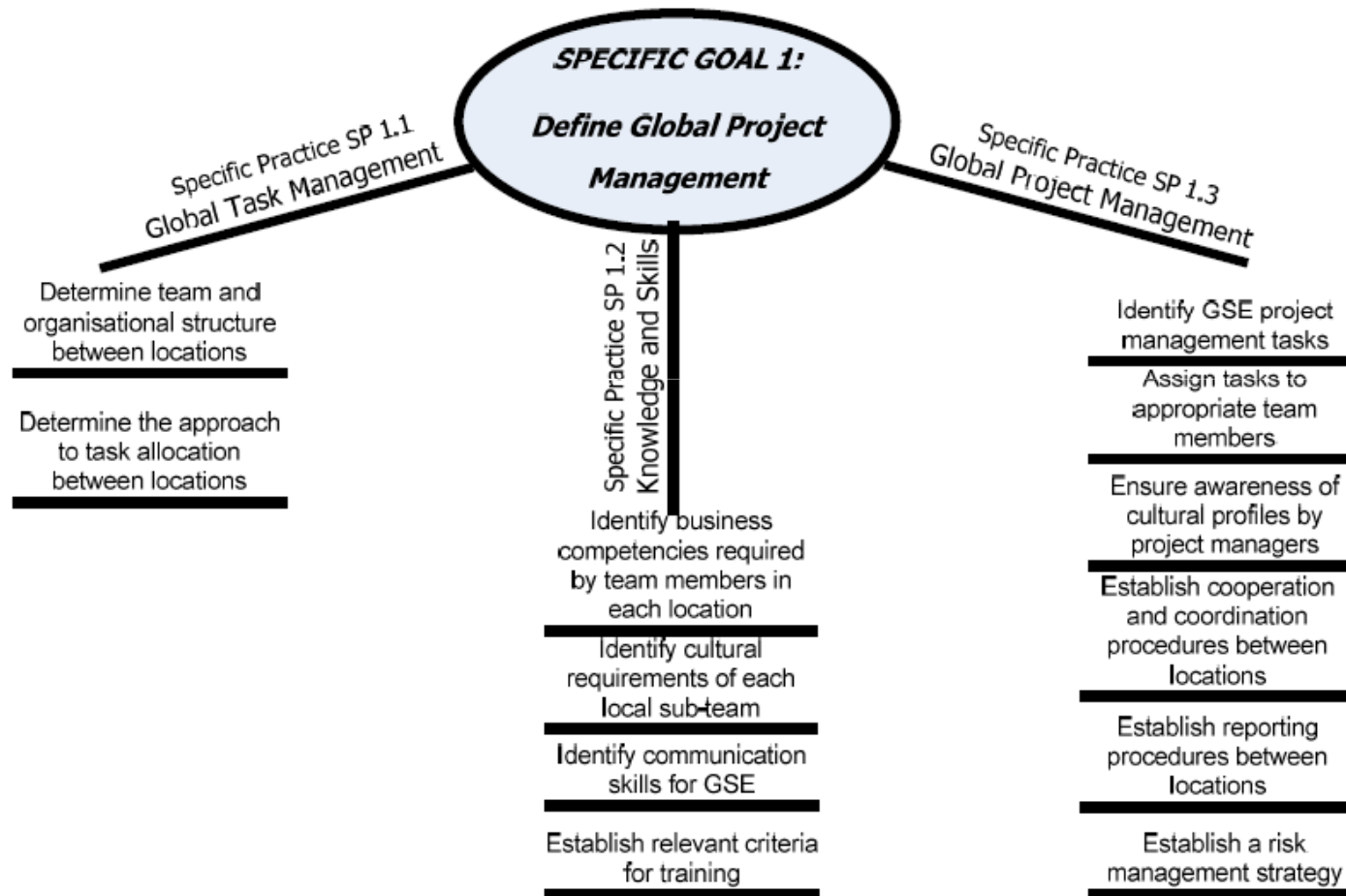
- Divide the work in a way that suits the expectations and skills of the team
- Manage cultural differences
- Overcome communication and coordination difficulty
- Ensure knowledge sharing

State of the art in GSD

- Specific proposals for
 - Tools to support communication, coordination, knowledge sharing, awareness
 - Best practices
 - Distributed development models
- Empirical studies

Distributed development models

(an example [Beecham et al 2010])



Empirical studies

- Have shown, among others, that
 - Outsourcing may require more people [Herbsleb and Mockus 2003]
 - Quality of software does not necessarily decrease, at least for internal global development [Bird et al. 2009]
 - Architectural rules help in addressing GSD issues [Clerc et al 2007]
 - A well modularized architecture can reduce communication needs and keep organizational structure stable [Avritzer et al. 2010]

State of the art: SOA and GSD

- To my knowledge, no systematic study on the implications of SOA on GSD (and vice versa)
 - In [Avritzer et al. 2010] the case study is a SOA
 - In [Hartman 2008] an experience adopting an ESB is reported

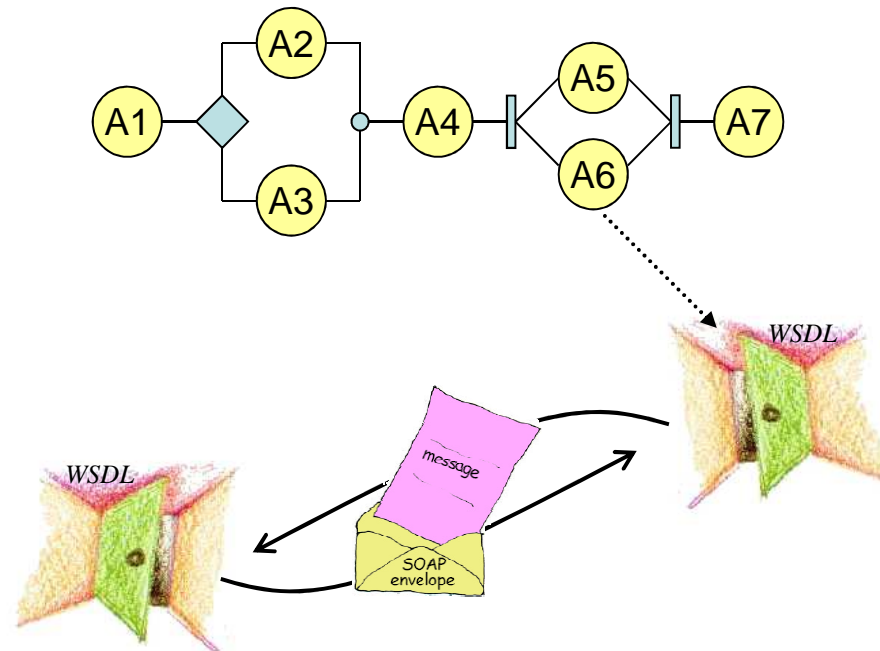
How SOA technology can help GSD

SOA for GSD

- SOA supports
 - Increased modularity and good decoupling
 - Clear division of work
 - Adoption of standards
- Various degrees of SOA adoption possible in GDS
 - Service development distribution/outsourcing
 - Service provision
 - Dynamic adoption of external services

Distributing/outsourcing service development

- SOA used as an integration technology
- Development of single services can be outsourced
- Business logic developed by a single team near the customer location



Distributing/outsourcing service development Impact on GSD issues (1)

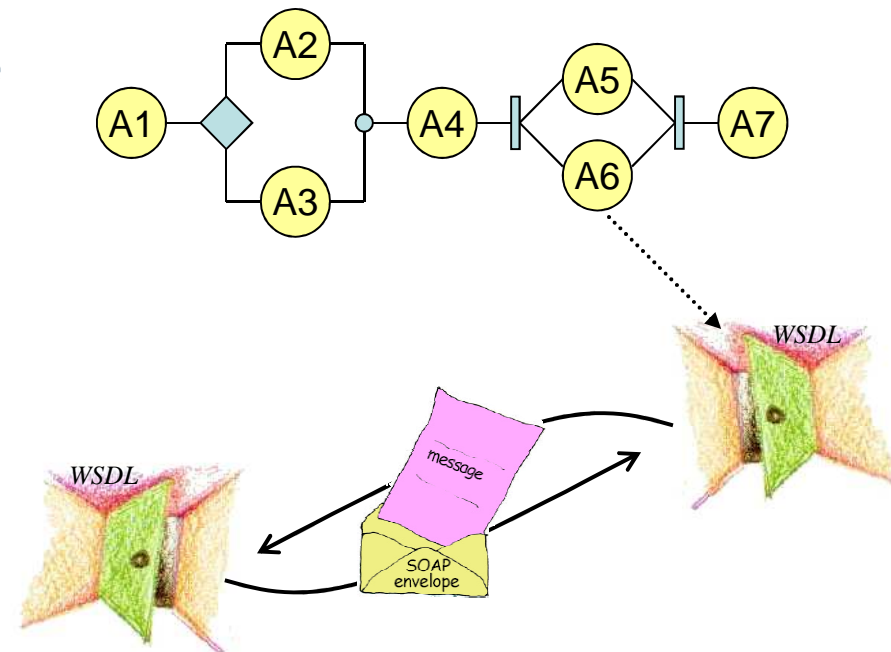
- GSD team composed of
 - Key team focusing on main logic development
 - Satellite teams managing services
- Criterion for task allocation
 - Transfer by functionality

Distributing/outsourcing service development Impact on GSD issues (2)

- Communication
 - Through service interface definition
- Coordination
 - Possibly reduced if composition logic is developed when services are already available
- Cultural differences
 - Extensive use of standard
- Knowledge management
 - Service registries

The SP approach

- Services offered by Service Providers (SP) are exploited
- The system runs on different domains
- Proper SLAs should be established beforehand



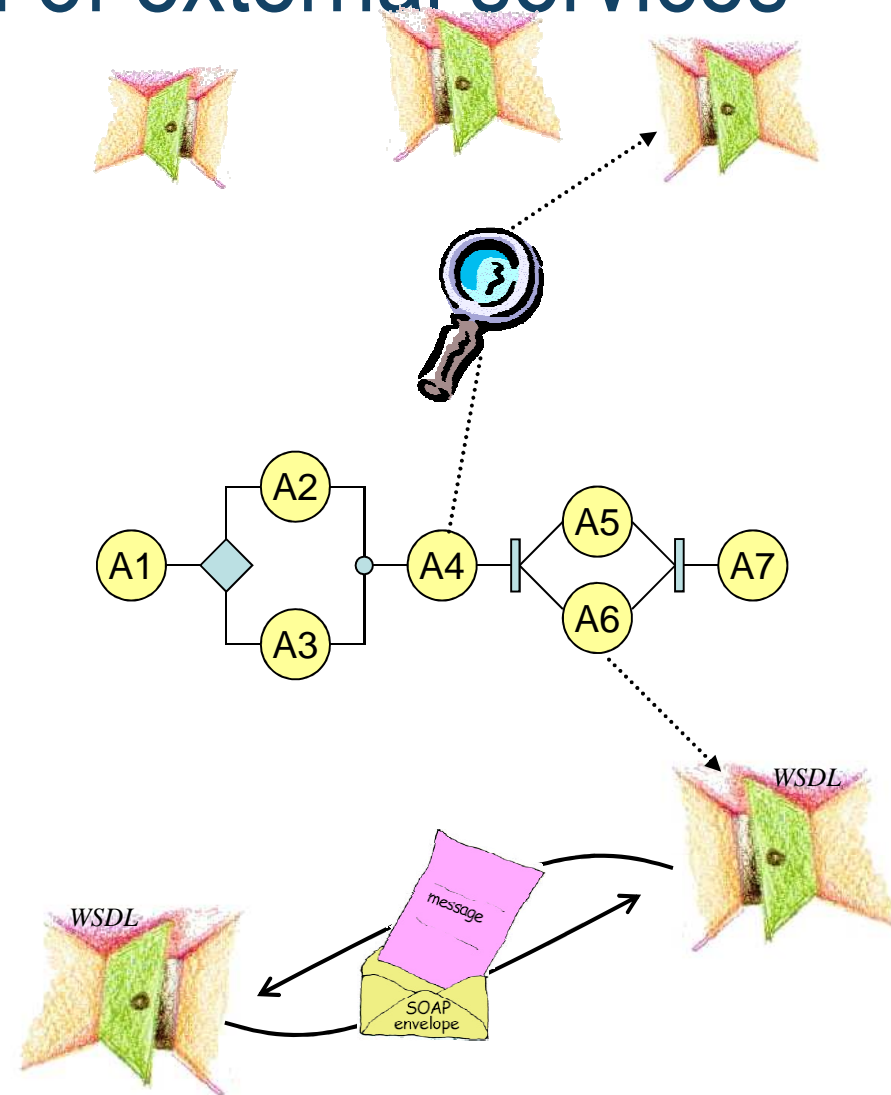
The SP approach

Impact on GSD issues

- More than outsourcing
 - *Execution* of services is in the hands of SP
- Team organization
 - New stakeholders: *service provider, service certifier*
- Trust
 - Need to define, monitor and enforce SLAs
- Not only GSD, but Global Software Engineering!

Dynamic adoption of external services

- Services are discovered and bound on the fly



Dynamic adoption of external services

Impact on GSD issues (1)

- More emphasis on runtime GSE activities
 - Monitoring
 - Dynamic adaptation and evolution of systems
- Evolution
 - Services can evolve independently of logic
 - Highlights an implicit dependency between organizations
 - Requirements for evolution identified within logic are not necessarily fulfilled by services

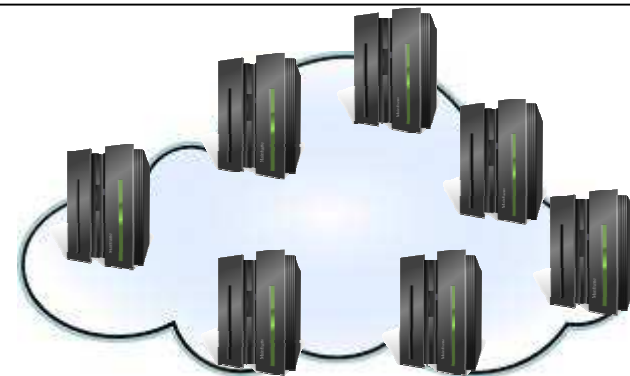
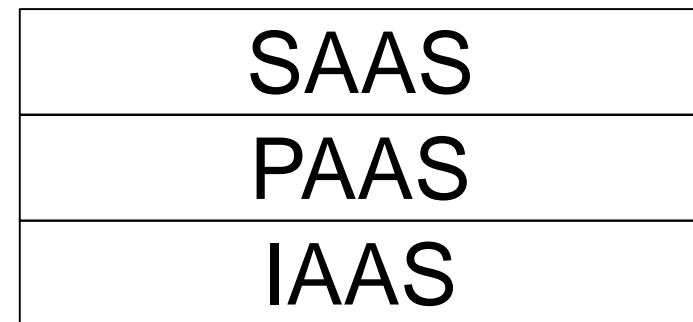
Dynamic adoption of external services

Impact on GSD issues (2)

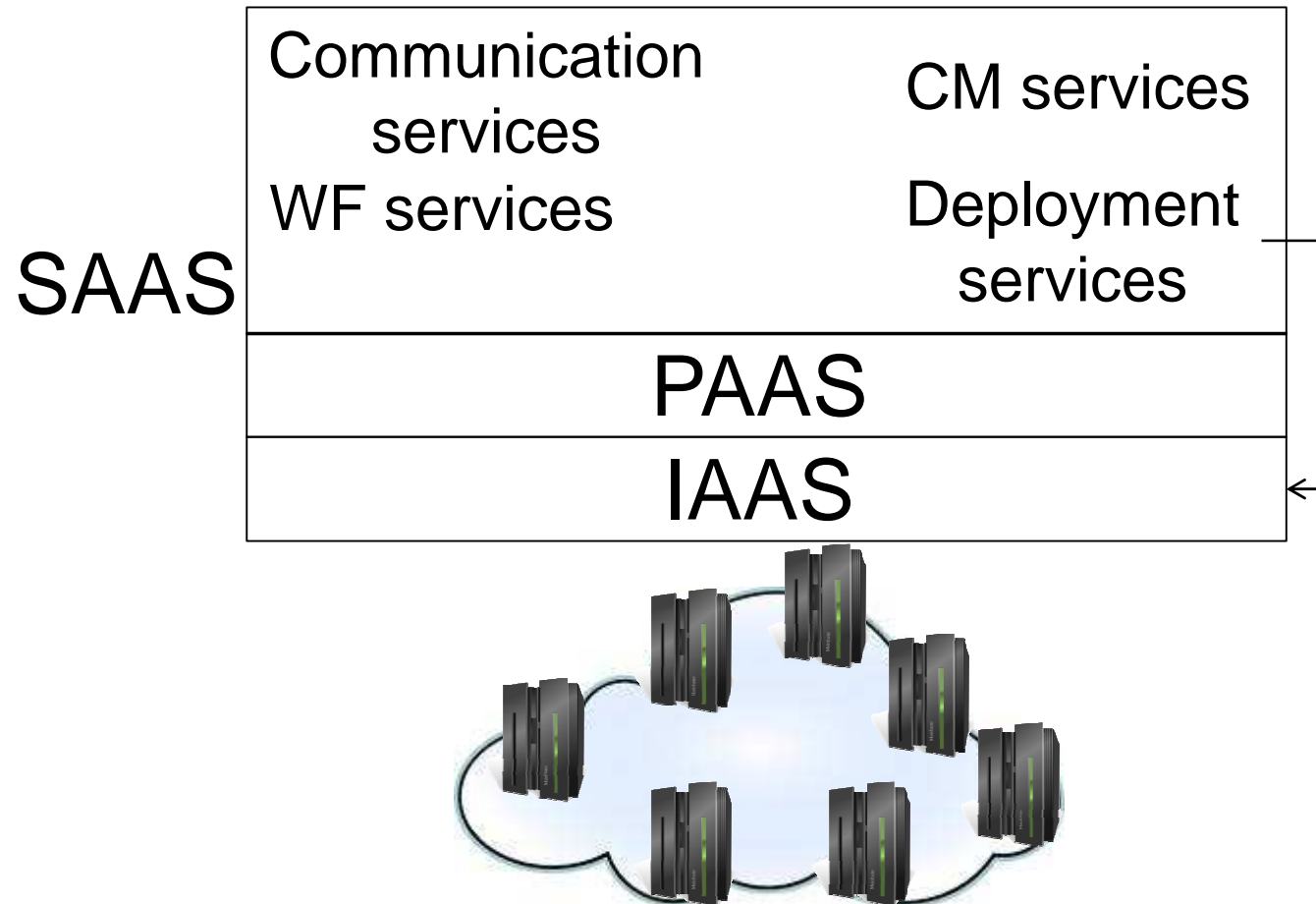
- Problem of trust
 - Service providers may be unknown
 - Need to focus on dynamic establishment of proper SLAs
- Advantages can arise not only from cooperation but also from competition
 - Competing teams offer services
 - Logic selects among them

Changing perspective...

- ... So far SOA as the architecture for the product ...
- Another perspective: Software As A Service (SAAS) to support the GSD process
 - Always-on IT services
 - Can support development, QA, operation
 - [Yara et al. 2009]



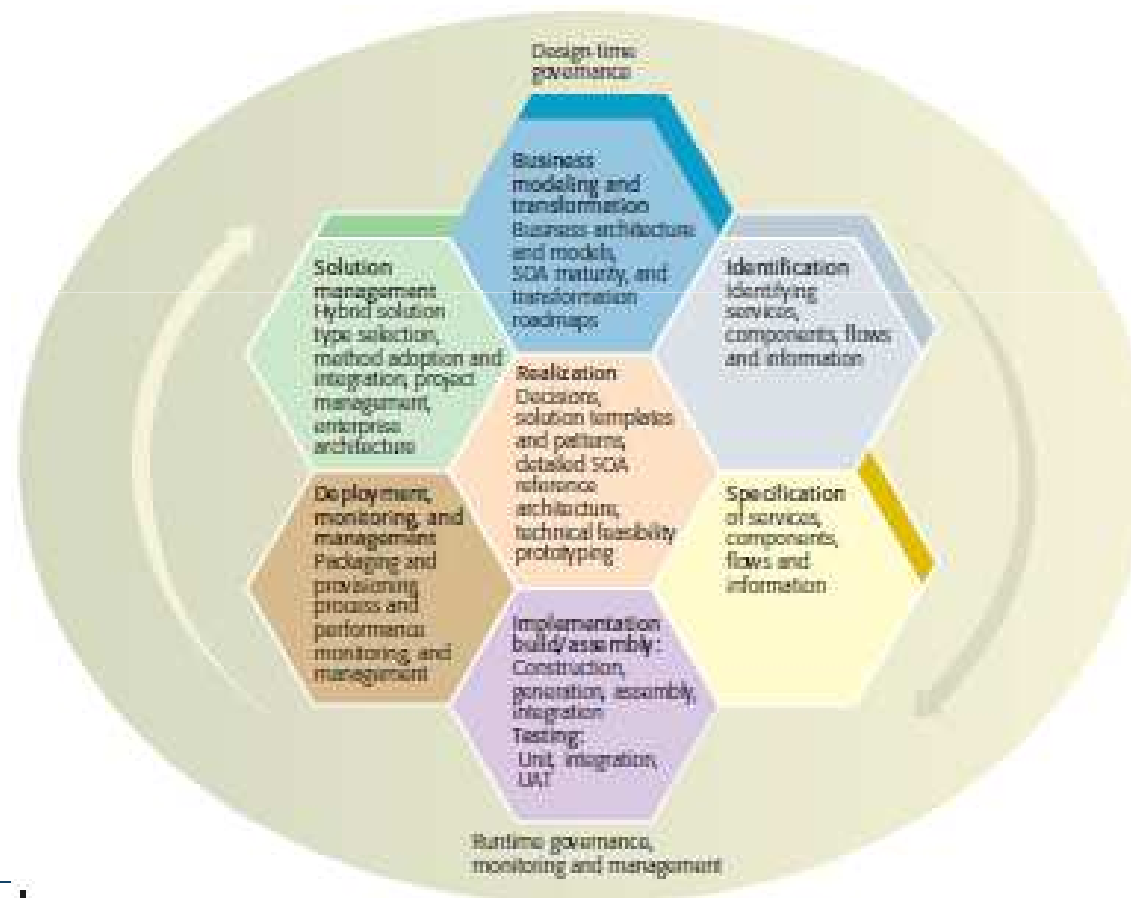
SAAS for GSD



How GSD/GSE can help SOA

Is SOA development global?

- Not necessarily ... But it is aimed at being global



Summary

What we learnt

- Frequently mentioned reasons for GSD
 - Cost
 - Vicinity to customers
 - Availability of expertise ...
- ... SOA can add new reasons
 - Availability of suitable and cost-effective services
 - Advantages in servicing existing components
- ... And new issues
 - Runtime aspects, new stakeholders, evolution issues, SLAs, competition

Some research questions (1)

- Can the adoption of SOA (specific architecture + set of standards) help in improving quality of GSD?
- To what extent GSD practices are useful in a SOA setting?
- How do the following issues impact GSD?
 - Competition between team
 - New stakeholders and new relationships to manage
 - New runtime issues
 - Implicit dependencies in evolution

Some research questions (2)

- Can GSD enterprises organize themselves as a network of service providers?
 - [Budge 2008] shows an example of this at Microsoft
- Can SOA/SAAS offer the proper infrastructure to support GSD?

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