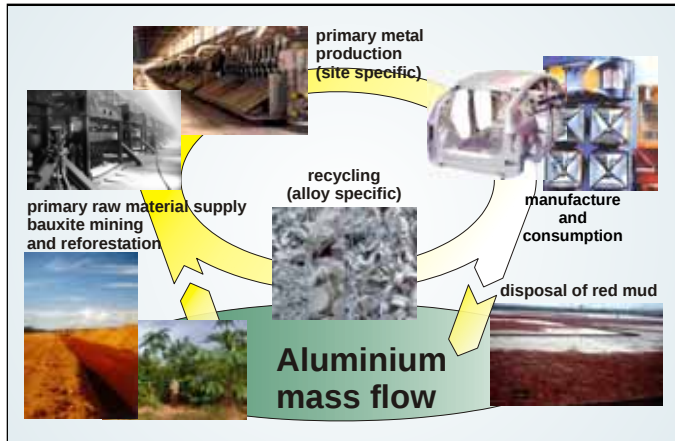


# The Use Phase in the Aluminum Mass Flow



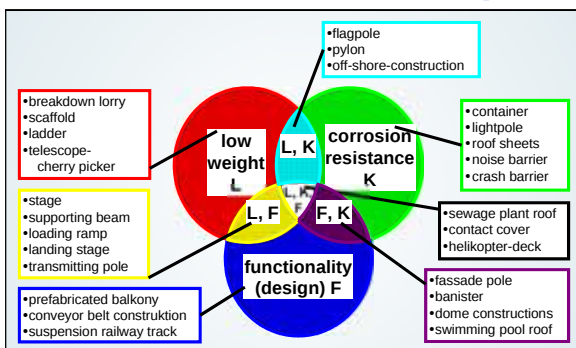
## Integration of the use phase

- Increasing economic growth and growing consumption
- Over-consumption of resources
- High emission of environmentally hazardous and insalubrious substance
- Significant user-related effects
- Varying of life-time of products or product-systems

### Main targets of the project

- Identification of environmental impacts during the use phase
- Quantification of induced environmental impacts of the particular product use, startup, maintenance and repair
- Identification of most important physical properties of Al
- Consideration of the influence of the user behavior on the environmental impact
- Compilation case studies which point out various user-related effects
- Integration of environmental impacts within the process chain

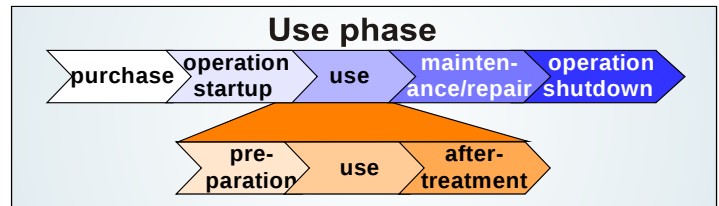
## Influence of the physical properties on the environmental impact



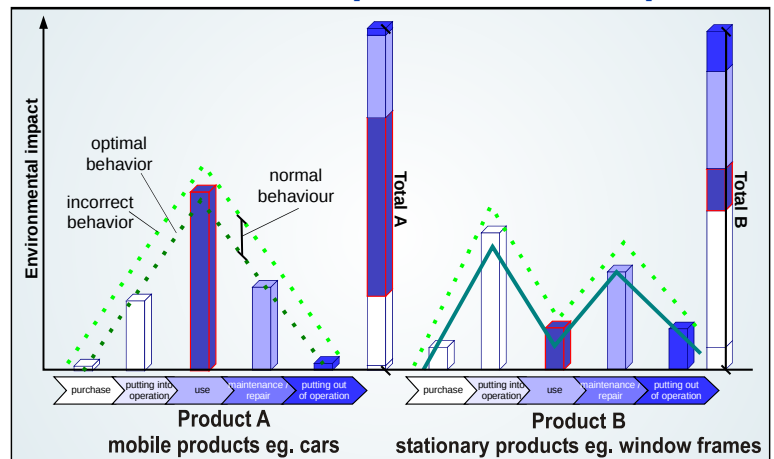
### Identification of important physical properties of aluminium

- Products have different requirements and importance on physical properties
- Consideration of multi-functional material properties
- Describing and analysing the ecological effects of these properties with regard to the entire environmental impact during the use phase

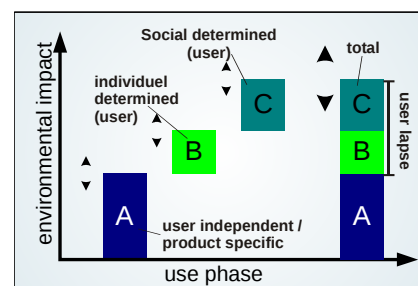
Production and use of metals like aluminium leads to direct and induced anthropogenic material and energy flows. An extensive investigation on aluminium by the Collaborative Research Center 525 "Resource-Orientated Analysis of Metallic Raw Material Flows" pointed out positive and negative effects associated with the distribution of aluminium in the biosphere and anthroposphere. Basis of this analysis is a process chain model of the aluminium industry.



## Environmental impact of the use phase



## Influence of the user behavior on the environmental impact



### User independent resp. product specific environmental impacts

- Fixed by chosen technology (user / constructor)
- Varies from old to ecological technology

### Individual determined environmental impacts

- Depends on ecological knowledge, income, education
- Varies between not important and directly affecting risks

### Social determined environmental impacts

- Depends on common values, standards, and political decisions
- Varies from local, regional and global surroundings

The presented work was carried out within the context of the German Collaborative Research Center 525 "Resource-orientated analysis of metallic raw material flows". This work was financially supported by the German Aluminium Association (GDA) and German Research Council (DFG).