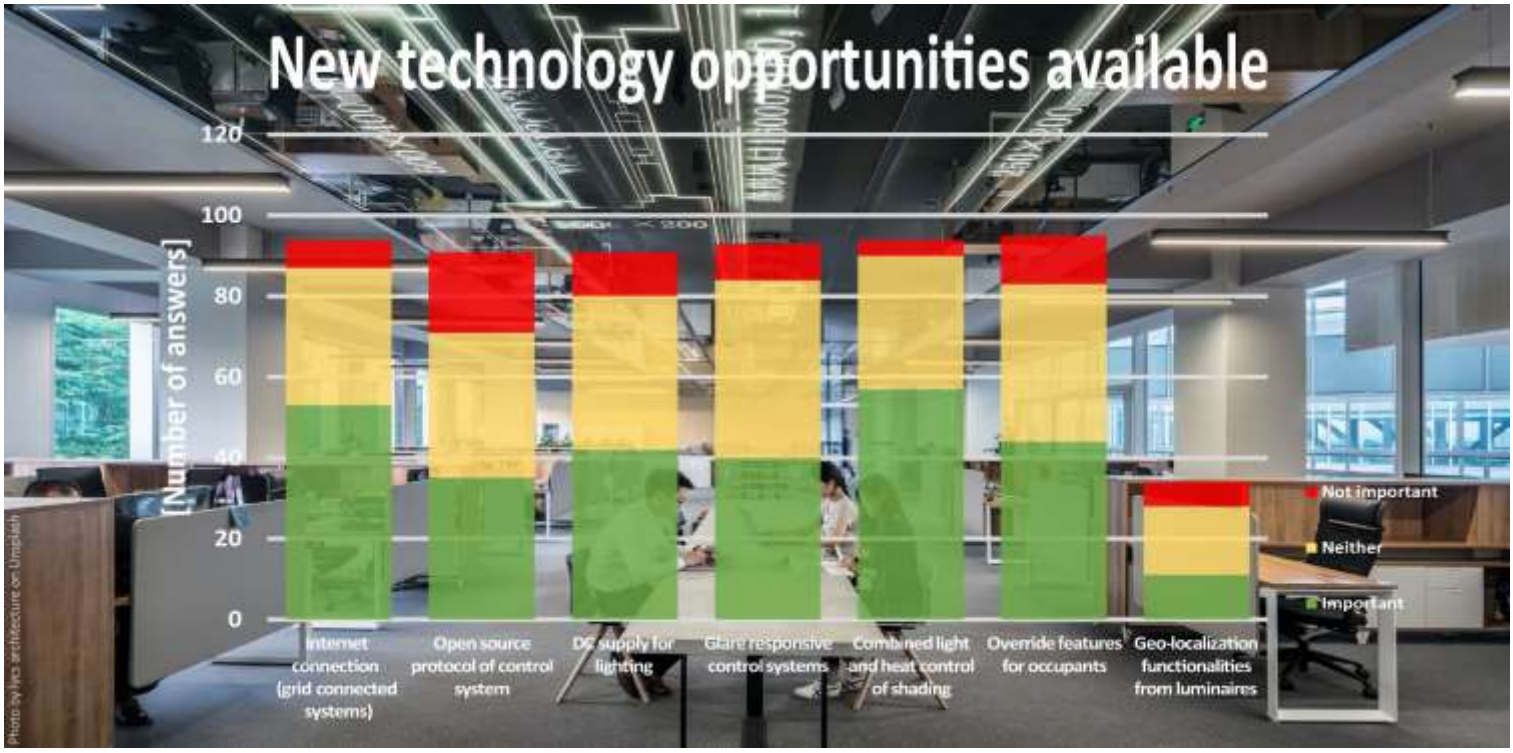
SOLAR HEATING & COOLING PROGRAMME
INTERNATIONAL ENERGY AGENCY

Survey on opportunities and barriers in lighting controls



IEA SHC Task 61 / EBC Annex 77: Integrated Solutions for Daylighting and Electric Lighting

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	Needs improvement	Does not need improvement
	Acceptable operation and coverage area of occupancy sensors	6	1		1	1
	Well-being / psychological and physiological	7			2	
Additional aspects you think are important (specify and rank)	NO smoothness on daylight control reaction of luminaires to avoid the “illuminance sack”, that is really annoying.	1			1	
	Aspects related to building owners / lease holders					
	Energy reduction	7			1	1
	Initial construction costs	5	1	1		2
	Running costs	6	1		2	
	“Green” image of building	5	2		1	1
	Clearly perceptible integration of daylighting and electric lighting	7			2	
	Contribution of the control systems to potential “green” certification of the building	6			2	
	User satisfaction / reduced complaints from user	7			2	
	Future proof – flexibility over long term	6	1		2	
	Signal value of building / architectural aesthetics	6	1		1	1
Additional aspects you think are important (specify and rank)	Energy consumption (real time and logbook function) monitoring	1				
	Integration with other building technics (BACnet, IoT,…)	1			1	
	New technology opportunities available					
Control functionality	Open source protocol of control system	4	2		2	
	Wireless capabilities	5	1		2	1
	Compatibility with other systems (BMS, HVAC, etc.)	5	1		2	
	Automatic control of daylight and electric lighting together	6			2	
	Daylight responsive control	5	1		1	1
	Integration of occupancy sensors	5		1	1	1
	Integration of other environmental sensors	5	1		2	

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	Needs improvement	Does not need improvement
	Internet connection (grid connected systems)	4	2		2	
	Open source protocol of control system	4	1	1	1	1
	DC supply for lighting	3	2	1	1	1
	Glare responsive control systems	3	2		1	
	Combined light and heat control of shading	5	1		2	
	Override features for occupants	6			2	
	Geo-localization functionalities from luminaires	3	3			
Other functionalities associated with lighting control (specify)	Human Centric Lighting in healthcare (both physical and psychological)	1				

Questionnaire conducted in Norway

Table 4. Results of survey conducted in Norway.

4 hits (100 %)

3 hits (75 %)

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	Needs improvement	Does not need improvement
	Demand from building managers / facility managers					
Energy aspects	Potential for reduction of lighting electricity consumption	3			1	
	Potential for reduction of peak lighting electric power	2		2	1	1
	Potential of shading system to reduce heat gains	3	1		1	1
	Potential of shading system to maintain sufficient daylight penetration	4			1	
	Automatic lighting control related to occupancy (occupancy sensors)	2	2		2	
	Automatic lighting control related to daylighting (daylight-sensors)	2	1		1	
Operational aspects	Easy commissioning / re-commissioning / calibration	2	2		1	

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	Needs improvement	Does not need improvement
	Robustness / low failure rate	2	2		1	
	Simplicity of operation (general management)	3	1		1	
	Warranty / life		3			1
	Flexibility over long term (reprogramming of luminaires according to new space organization)	4			1	
	Future proof concepts (to ease long term maintenance and replacement of equipment)	2			1	
	Cost issues (initial)	4			1	
	Cost issues (ongoing)	2	2		1	
	Standardization issues	1	1			1
	Quality labelling issues (R2S etc.) for new generation of controls	1	1		1	
Additional aspects you think are important (specify and rank)						
	Aspects related to occupants / demand from occupants					
Occupant control	Simplicity of operation (switches / interfaces)	3	1		2	
	Design quality of interfaces (aesthetics / haptic)	3		1	1	
	Capacity to override control system	3	1		1	
	Manual switching possibility	3	1			1
	Manual adjustment of illuminance level	4			1	
	Manual adjustment of spectrum of light	2	1	1	2	
	Manual control per zone	2		2	1	
	Automatic adjustment of illuminance	3	1		1	
	Automatic adjustment of spectrum of light		1	3		
	Automatic lighting control per zone in the space	2	1	1	1	
	Capability of occupants to open shading systems manually	3	1		1	
	Capability of occupants to close shading systems manually	2	2		1	

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	Needs improvement	Does not need improvement
	Independent control of ambient and task lighting (offices, industry)	2	2		1	1
	Capacity to override control system	1	1			1
	Personal control of lighting and shading from workplace	3	1		2	
Occupant comfort	Possibility to limit glare from windows	3	1		1	
	Possibility to limit unwanted heat gains	2	2		1	
	Smoothness of transition of lighting variations to avoid annoyance	1	2		1	
	Acceptable operation and coverage area of occupancy sensors	1	1	2	1	
	Well-being / psychological and physiological	3		1	1	
Additional aspects you think are important (specify and rank)						
	Aspects related to building owners / lease holders					
	Energy reduction	3			1	
	Initial construction costs	3				
	Running costs	2	1			
	“Green” image of building	3	1			
	Clearly perceptible integration of daylighting and electric lighting	1	1	1		
	Contribution of the control systems to potential “green” certification of the building	2	1			
	User satisfaction / reduced complaints from user	2	1	1	1	
	Future proof – flexibility over long term	3		1	1	
	Signal value of building / architectural aesthetics		2	2	1	
Additional aspects you think are important (specify and rank)						
	New technology opportunities available					

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	Needs improvement	Does not need improvement
Control functionality	Open source protocol of control system	2		1	1	
	Wireless capabilities			3	1	
	Compatibility with other systems (BMS, HVAC, etc.)	3		1	1	
	Automatic control of daylight and electric lighting together	3				
	Daylight responsive control	1	2		Not in every room	
	Integration of occupancy sensors	1	1	1		
	Integration of other environmental sensors		1	2		
	Internet connection (grid connected systems)			2	discussible	
	Open source protocol of control system	1		1		
	DC supply for lighting			1		
	Glare responsive control systems	1		2		
	Combined light and heat control of shading	1		1		
	Override features for occupants	2				
	Geo-localization functionalities from luminaires		1	1		
Other functionalities associated with lighting control (specify)						

Questionnaire conducted in Poland

Table 5. *R*esults of survey conducted in Poland.

>11 (> 75 %) > 7 and ≤ 11 (> 50 % and ≤ 75 %)

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	4 Needs improvement	5 Does not need improvement
	Demand from building managers / facility managers					
Energy aspects A	Potential for reduction of lighting electricity consumption	7	2		5	1
	Potential for reduction of peak lighting electric power	4	2	3	4	2

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	4 Needs improvement	5 Does not need improvement
	Potential of shading system to reduce heat gains	5	1	3	5	
	Potential of shading system to maintain sufficient daylight penetration	5	1	1	8	
	Automatic lighting control related to occupancy (occupancy sensors)	3	5	1	3	2
	Automatic lighting control related to daylighting (daylight-sensors)	4	4	1	5	
Operational aspects B	Easy commissioning / re-commissioning/ calibration	3	5		5	
	Robustness / low failure rate	7	2		4	1
	Simplicity of operation (general management)	7	2		6	
	Warranty / life	8	1		5	
	Flexibility over long term (reprogramming of luminaires according to new space organization)	2	4	3	3	2
	Future proof concepts (to ease long term maintenance and replacement of equipment)	6	2	1	3	2
	Cost issues (initial)	8	1		6	
	Cost issues (ongoing)	9			5	
	Standardization issues	3	4	2	3	2
	Quality labelling issues (R2S etc.) for new generation of controls	4	2	3	3	2
Additional aspects you think are important (specify and rank)						
	Aspects related to occupants / demand from occupants					
Occupant control	Simplicity of operation (switches / interfaces)	6	2		5	
	Design quality of interfaces (aesthetics / haptic)	4	4	1	2	2
	Capacity to override control system	3	4	2	3	2
	Manual switching possibility	4	4		6	
	Manual adjustment of illuminance level	3	5	1	5	
	Manual adjustment of spectrum of light	4	3	2	3	2

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	4 Needs improvement	5 Does not need improvement
	Manual control per zone	6	2	1	3	2
	Automatic adjustment of illuminance	7	1	1	4	2
	Automatic adjustment of spectrum of light	5	3	1	3	2
	Automatic lighting control per zone in the space	6	2	1	3	2
	Capability of occupants to open shading systems manually	5	4		6	
	Capability of occupants to close shading systems manually	7	2		6	
	Independent control of ambient and task lighting (offices, industry)	6	3		5	
	Capacity to override control system	4	5		5	
	Personal control of lighting and shading from workplace	9			6	
Occupant comfort	Possibility to limit glare from windows	7	2		7	
	Possibility to limit unwanted heat gains	8	1		3	2
	Smoothness of transition of lighting variations to avoid annoyance	4	4	1	3	2
	Acceptable operation and coverage area of occupancy sensors	6	1	2	3	2
	Well-being / psychological and physiological	9			6	
Additional aspects you think are important (specify and rank)						
	Aspects related to building owners / lease holders					
	Energy reduction	9			6	
	Initial construction costs	5	4		5	
	Running costs	5	4		5	
	“Green” image of building	6	2	1	5	1
	Clearly perceptible integration of daylighting and electric lighting	5	3	1	3	2

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	4 Needs improvement	5 Does not need improvement
	Contribution of the control systems to potential “green” certification of the building	5	3	1	5	1
	User satisfaction / reduced complaints from user	5	4		5	
	Future proof – flexibility over long term	6	2	1	4	1
	Signal value of building / architectural aesthetics	6	3		5	1
Additional aspects you think are important (specify and rank)						
	New technology opportunities available					
Control functionality	Open source protocol of control system	2	5	2	4	1
	Wireless capabilities	7	2		6	
	Compatibility with other systems (BMS, HVAC, etc.)	8	3		5	
	Automatic control of daylight and electric lighting together	6	2	1	5	
	Daylight responsive control	4	3	2	4	1
	Integration of occupancy sensors	3	5	1	5	
	Integration of other environmental sensors	6	3		3	2
	Internet connection (grid connected systems)	7	2		6	
	Open source protocol of control system	5	3	1	5	
	DC supply for lighting	4	4		5	
	Glare responsive control systems	4	4	1	4	1
	Combined light and heat control of shading	7	2		5	
	Override features for occupants	4	5		5	
	Geo-localization functionalities from luminaires	5	4		6	
Other functionalities associated with lighting control (specify)						

Questionnaire conducted in Austria

Table 6. Results of survey conducted in Austria.

≥ 8 (> 75 %) ≥ 6 and ≤ 7 (≥ 50 % and < 75 %)

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	Needs improvement	Does not need improvement
	Demand from building managers / facility managers					
Energy aspects	Potential for reduction of lighting electricity consumption	7	3		5	2
	Potential for reduction of peak lighting electric power	4	5	1	5	2
	Potential of shading system to reduce heat gains	8	1	1	5	2
	Potential of shading system to maintain sufficient daylight penetration	8	2		7	
	Automatic lighting control related to occupancy (occupancy sensors)	8	2		4	3
	Automatic lighting control related to daylighting (daylight-sensors)	8	2		7	
Operational aspects	Easy commissioning / re-commissioning / calibration	10			6	
	Robustness / low failure rate	9	1		5	2
	Simplicity of operation (general management)	10			6	
	Warranty / life	5	5		3	3
	Flexibility over long term (reprogramming of luminaires according to new space organization)	7	2	1	5	1
	Future proof concepts (to ease long term maintenance and replacement of equipment)	9	1		7	
	Cost issues (initial)	6	4		5	2
	Cost issues (ongoing)	7	3		5	2
	Standardization issues	6	3		6	
	Quality labelling issues (R2S etc.) for new generation of controls	5	3	1	5	1
Additional aspects you think are important (specify and rank)	Integration with other building controls (e.g. heating)	1			1	
	Aspects related to occupants / demand from occupants					
Occupant control	Simplicity of operation (switches / interfaces)	10			6	
	Design quality of interfaces (aesthetics / haptic)	4	5	1	4	2
	Capacity to override control system	4	3	2	4	2

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	Needs improvement	Does not need improvement
	Manual switching possibility	6	3		3	3
	Manual adjustment of illuminance level	6	3	1	4	2
	Manual adjustment of spectrum of light	2	5	3	3	3
	Manual control per zone	6	3	1	3	3
	Automatic adjustment of illuminance	7	3		6	
	Automatic adjustment of spectrum of light	4	4	2	5	1
	Automatic lighting control per zone in the space	4	5	1	3	3
	Capability of occupants to open shading systems manually	5	4	1	1	5
	Capability of occupants to close shading systems manually	6	4		3	3
	Independent control of ambient and task lighting (offices, industry)	6	3	1	2	4
	Capacity to override control system	4	4	2	2	4
	Personal control of lighting and shading from workplace	8	2		5	1
Occupant comfort	Possibility to limit glare from windows	8	2		5	1
	Possibility to limit unwanted heat gains	7	3		6	
	Smoothness of transition of lighting variations to avoid annoyance	6	4		6	
	Acceptable operation and coverage area of occupancy sensors	3	5	1	5	1
	Well-being / psychological and physiological	9	1		7	
Additional aspects you think are important (specify and rank)						
	Aspects related to building owners / lease holders					
	Energy reduction	8	3	1	6	1
	Initial construction costs	8	3	1	7	
	Running costs	8	3	1	6	1
	“Green” image of building	5	5		5	1
	Clearly perceptible integration of daylighting and electric lighting	6	3		6	1
	Contribution of the control systems to potential “green” certification of the building	6	4		6	1
	User satisfaction / reduced complaints from user	8	2		6	1
	Future proof – flexibility over long term	7	3		7	

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	Needs improvement	Does not need improvement
	Signal value of building / architectural aesthetics	5	5		4	2
Additional aspects you think are important (specify and rank)						
	New technology opportunities available					
Control functionality	Open source protocol of control system	4	4		6	
	Wireless capabilities	7	1		7	
	Compatibility with other systems (BMS, HVAC, etc.)	7	1		6	1
	Automatic control of daylight and electric lighting together	7	1		5	1
	Daylight responsive control	7	1		5	1
	Integration of occupancy sensors	4	3	1	3	3
	Integration of other environmental sensors	6	2		7	
	Internet connection (grid connected systems)	3	4	1	6	
	Open source protocol of control system	3	3		5	1
	DC supply for lighting		6	2	5	1
	Glare responsive control systems	6	2		5	1
	Combined light and heat control of shading	8			7	
	Override features for occupants	4	4		4	2
	Geo-localization functionalities from luminaires	2	4	2	5	2
Other functionalities associated with lighting control (specify)	Cloud connection		1			

Questionnaire conducted in Sweden

Table 7. Results of Survey conducted in Sweden.

5 hits (100 %)

3 and 4 hits (~> 60 % ≤ 80 %)

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	Needs improvement	Does not need improvement
	Demand from building managers / facility managers					
Energy aspects	Potential for reduction of lighting electricity consumption	2		3		
	Potential for reduction of peak lighting electric power	2	1	2		
	Potential of shading system to reduce heat gains	4		1		

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	Needs improvement	Does not need improvement
	Potential of shading system to maintain sufficient daylight penetration	3		1	1	
	Automatic lighting control related to occupancy (occupancy sensors)	1	1	2	1	
	Automatic lighting control related to daylighting (daylight-sensors)	1		1	3	
Operational aspects	Easy commissioning / re-commissioning / calibration	1			4	
	Robustness / low failure rate	3			2	
	Simplicity of operation (general management)	4			1	
	Warranty / life	3	1		1	
	Flexibility over long term (reprogramming of luminaires according to new space organization)	3	1	1		
	Future proof concepts (to ease long term maintenance and replacement of equipment)	3			2	
	Cost issues (initial)	1	1		3	
	Cost issues (ongoing)	1	1	1	1	1
	Standardization issues	2		2	1	
	Quality labelling issues (R2S etc.) for new generation of controls	1	1	2	1	
Additional aspects you think are important (specify and rank)	Integration with BMS / other systems (at least HVAC, but also security, fire alarm emergency lighting, room reservation,…)					
	Aspects related to occupants / demand from occupants					
Occupant control	Simplicity of operation (switches / interfaces)	2			2	
	Design quality of interfaces (aesthetics / haptic)	1	2		2	
	Capacity to override control system	5				
	Manual switching possibility	5				
	Manual adjustment of illuminance level	3	2			
	Manual adjustment of spectrum of light		2	3		
	Manual control per zone	2	1	1	1	
	Automatic adjustment of illuminance	1	1	2	1	
	Automatic adjustment of spectrum of light		1	3	1	
	Automatic lighting control per zone in the space	2	1	1	1	
	Capability of occupants to open shading systems manually	5				
	Capability of occupants to close shading systems manually	4	1			
	Independent control of ambient and task lighting (offices, industry)	4	1			

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	Needs improvement	Does not need improvement
	Personal control of lighting and shading from workplace	4	1			
Occupant comfort	Possibility to limit glare from windows	4			1	
	Possibility to limit unwanted heat gains	3	1		1	
	Smoothness of transition of lighting variations to avoid annoyance	3	1		1	
	Acceptable operation and coverage area of occupancy sensors	2	2		1	
	Well-being / psychological and physiological	1				
Additional aspects you think are important (specify and rank)	The problem is in landscape offices. Everyone has unique visual needs. Landscape offices are anyway very problematic as work environments.					
	Aspects related to building owners / lease holders					
	Energy reduction	2				
	Initial construction costs	2				
	Running costs	1			1	
	“Green” image of building	1			1	
	Clearly perceptible integration of daylighting and electric lighting		1		1	
	Contribution of the control systems to potential “green” certification of the building	1		1		
	User satisfaction / reduced complaints from user		1		1	
	Future proof – flexibility over long term	1			1	
	Signal value of building / architectural aesthetics		1		1	
Additional aspects you think are important (specify and rank)						
	New technology opportunities available					
Control functionality	Open source protocol of control system	2				
	Wireless capabilities	2				
	Compatibility with other systems (BMS, HVAC, etc.)	1			1	
	Automatic control of daylight and electric lighting together		1		1	
	Daylight responsive control		1		1	
	Integration of occupancy sensors	1			1	
	Integration of other environmental sensors		1		1	
	Internet connection (grid connected systems)	1			1	
	Open source protocol of control system	1			1	
	DC supply for lighting		1	1		

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	Needs improvement	Does not need improvement
	Glare responsive control systems		1		1	
	Combined light and heat control of shading	1	1			
	Override features for occupants	2				
	Geo-localization functionalities from luminaires		1	1		
Other functionalities associated with lighting control (specify)						

Questionnaire conducted in Italy

Table 8. Results of survey conducted in Italy.

3 answers (100 %) 2 answers (answers)

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	Needs improvement	Does not need improvement
	Demand from building managers / facility managers					
Energy aspects	Potential for reduction of lighting electricity consumption	2			1	
	Potential for reduction of peak lighting electric power	1	2			
	Potential of shading system to reduce heat gains	1	2			
	Potential of shading system to maintain sufficient daylight penetration	1	2			
	Automatic lighting control related to occupancy (occupancy sensors)	2	1			
	Automatic lighting control related to daylighting (daylight-sensors)	2	1			
Operational aspects	Easy commissioning / re-commissioning / calibration	1	2			
	Robustness / low failure rate	1	2			
	Simplicity of operation (general management)	1		1		
	Warranty / life	1	2			
	Flexibility over long term (reprogramming of	1	1	1		

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	Needs improvement	Does not need improvement
	luminaires according to new space organization)					
	Future proof concepts (to ease long term maintenance and replacement of equipment)	2				1
	Cost issues (initial)	2		1		
	Cost issues (ongoing)	1	1	1		
	Standardization issues		1		1	
	Quality labelling issues (R2S etc.) for new generation of controls	1		1		1
Additional aspects you think are important (specify and rank)						
	Aspects related to occupants / demand from occupants					
Occupant control	Simplicity of operation (switches / interfaces)	3				
	Design quality of interfaces (aesthetics / haptic)		2	1		
	Capacity to override control system		1	2		
	Manual switching possibility	1			1	
	Manual adjustment of illuminance level		2	1		
	Manual adjustment of spectrum of light		3			
	Manual control per zone	2	1			
	Automatic adjustment of illuminance	1	2			
	Automatic adjustment of spectrum of light		1	2		
	Automatic lighting control per zone in the space	3				
	Capability of occupants to open shading systems manually	1	1			1
	Capability of occupants to close shading systems manually	1	1	1		

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	Needs improvement	Does not need improvement
	Independent control of ambient and task lighting (offices, industry)		3			
	Capacity to override control system	1	1			
	Personal control of lighting and shading from workplace	1	1	1		
Occupant comfort	Possibility to limit glare from windows	2		1		
	Possibility to limit unwanted heat gains	1	2			
	Smoothness of transition of lighting variations to avoid annoyance	1	1	1		
	Acceptable operation and coverage area of occupancy sensors		2		1	
	Well-being / psychological and physiological	2			1	
Additional aspects you think are important (specify and rank)						
	Aspects related to building owners / lease holders					
	Energy reduction	3				
	Initial construction costs	2	1			
	Running costs	2	1			
	“Green” image of building		2		1	
	Clearly perceptible integration of daylighting and electric lighting		2	1		
	Contribution of the control systems to potential “green” certification of the building	1	2			
	User satisfaction / reduced complaints from user	1	1			
	Future proof – flexibility over long term	1	2			
	Signal value of building / architectural aesthetics		1	2		
Additional aspects you think are important						

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	Needs improvement	Does not need improvement
(specify and rank)						
	New technology opportunities available					
Control functionality	Open source protocol of control system	2	1			
	Wireless capabilities	1	2			
	Compatibility with other systems (BMS, HVAC, etc.)	1		1		
	Automatic control of daylight and electric lighting together	1			1	
	Daylight responsive control	1		1		
	Integration of occupancy sensors	2	1			
	Integration of other environmental sensors	2	1			
	Internet connection (grid connected systems)		3			
	DC supply for lighting		1	1		
	Glare responsive control systems		1		1	
	Combined light and heat control of shading		2			1
	Override features for occupants	1	2			
	Geo-localization functionalities from luminaires	1	1	1		
Other functionalities associated with lighting control (specify)						

Questionnaire conducted in Germany

In Germany the total respondents are only one and are presenting following areas: Designer Maintenance in the Engineering Industry.

Table 9. Results of survey conducted in Germany.

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	Needs improvement	Does not need improvement
	Demand from building managers / facility managers					

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	Needs improvement	Does not need improvement
Energy aspects	Potential for reduction of lighting electricity consumption	1			1	
	Potential for reduction of peak lighting electric power		1			
	Potential of shading system to reduce heat gains	1			1	
	Potential of shading system to maintain sufficient daylight penetration	1			1	
	Automatic lighting control related to occupancy (occupancy sensors)		1		1	
	Automatic lighting control related to daylighting (daylight-sensors)		1		1	
Operational aspects	Easy commissioning / re-commissioning / calibration	1			1	
	Robustness / low failure rate		1			
	Simplicity of operation (general management)	1			1	
	Warranty / life		1			
	Flexibility over long term (reprogramming of luminaires according to new space organization)		1			
	Future proof concepts (to ease long term maintenance and replacement of equipment)					
	Cost issues (initial)	1				
	Cost issues (ongoing)	1			1	
	Standardization issues					
	Quality labelling issues (R2S etc.) for new generation of controls		1			
Additional aspects you think are important (specify and rank)						
	Aspects related to occupants / demand from occupants					
Occupant control	Simplicity of operation (switches / interfaces)	1			1	

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	Needs improvement	Does not need improvement
	Design quality of interfaces (aesthetics / haptic)		1		1	
	Capacity to override control system		1			
	Manual switching possibility	1				
	Manual adjustment of illuminance level	1				
	Manual adjustment of spectrum of light			1		
	Manual control per zone		1			
	Automatic adjustment of illuminance			1		
	Automatic adjustment of spectrum of light			1		
	Automatic lighting control per zone in the space			1		
	Capability of occupants to open shading systems manually	1				
	Capability of occupants to close shading systems manually	1				
	Independent control of ambient and task lighting (offices, industry)	1				
	Capacity to override control system		1			
	Personal control of lighting and shading from workplace	1				
Occupant comfort	Possibility to limit glare from windows	1				
	Possibility to limit unwanted heat gains		1			
	Smoothness of transition of lighting variations to avoid annoyance			1		
	Acceptable operation and coverage area of occupancy sensors		1			
	Well-being / psychological and physiological	1			1	
Additional aspects you think are important (specify and rank)						

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	Needs improvement	Does not need improvement
	Aspects related to building owners / lease holders					
	Energy reduction	1			1	
	Initial construction costs	1				
	Running costs	1				
	“Green” image of building		1			
	Clearly perceptible integration of daylighting and electric lighting		1			
	Contribution of the control systems to potential “green” certification of the building			1		
	User satisfaction / reduced complaints from user	1			1	
	Future proof – flexibility over long term	1			1	
	Signal value of building / architectural aesthetics		1			
Additional aspects you think are important (specify and rank)						
	New technology opportunities available					
Control functionality	Open source protocol of control system			1		
	Wireless capabilities		1			
	Compatibility with other systems (BMS, HVAC, etc.)	1			1	
	Automatic control of daylight and electric lighting together	1			1	
	Daylight responsive control	1			1	
	Integration of occupancy sensors		1			
	Integration of other environmental sensors		1			
	Internet connection (grid connected systems)		1			
	DC supply for lighting			1		
	Glare responsive control systems		1			
	Combined light and heat control of shading	1			1	

	Ranking of importance: 1 = very important to 3 not important.	1 Important	2	3 Not important	Needs improvement	Does not need improvement
	Override features for occupants		1			
	Geo-localization functionalities from luminaires			1		
Other functionalities associated with lighting control (specify)						