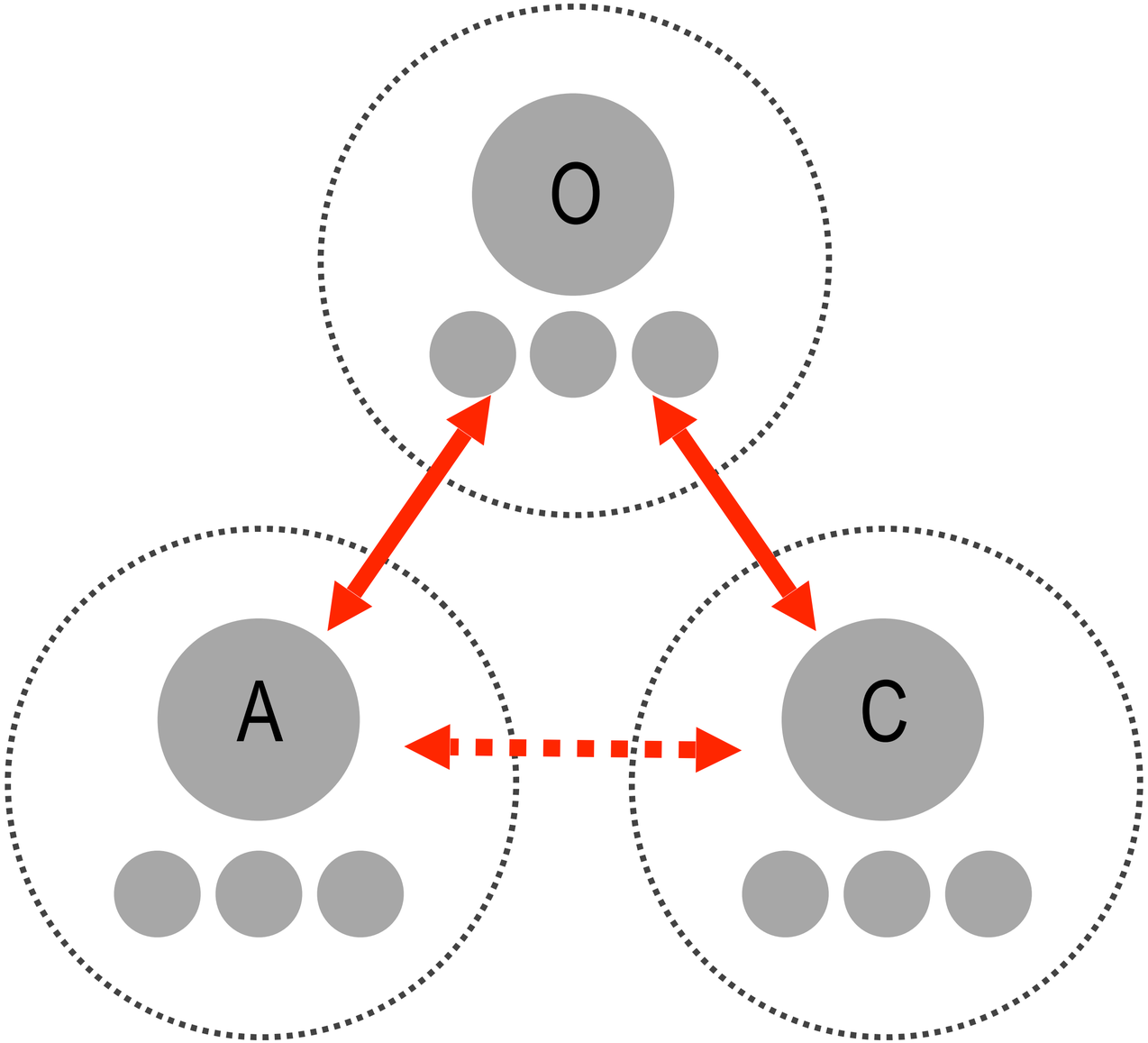
Introduction to Integrated Project Delivery

First Responders Campus

General Committee + Committee of the Whole | March 2017

IPD vs Traditional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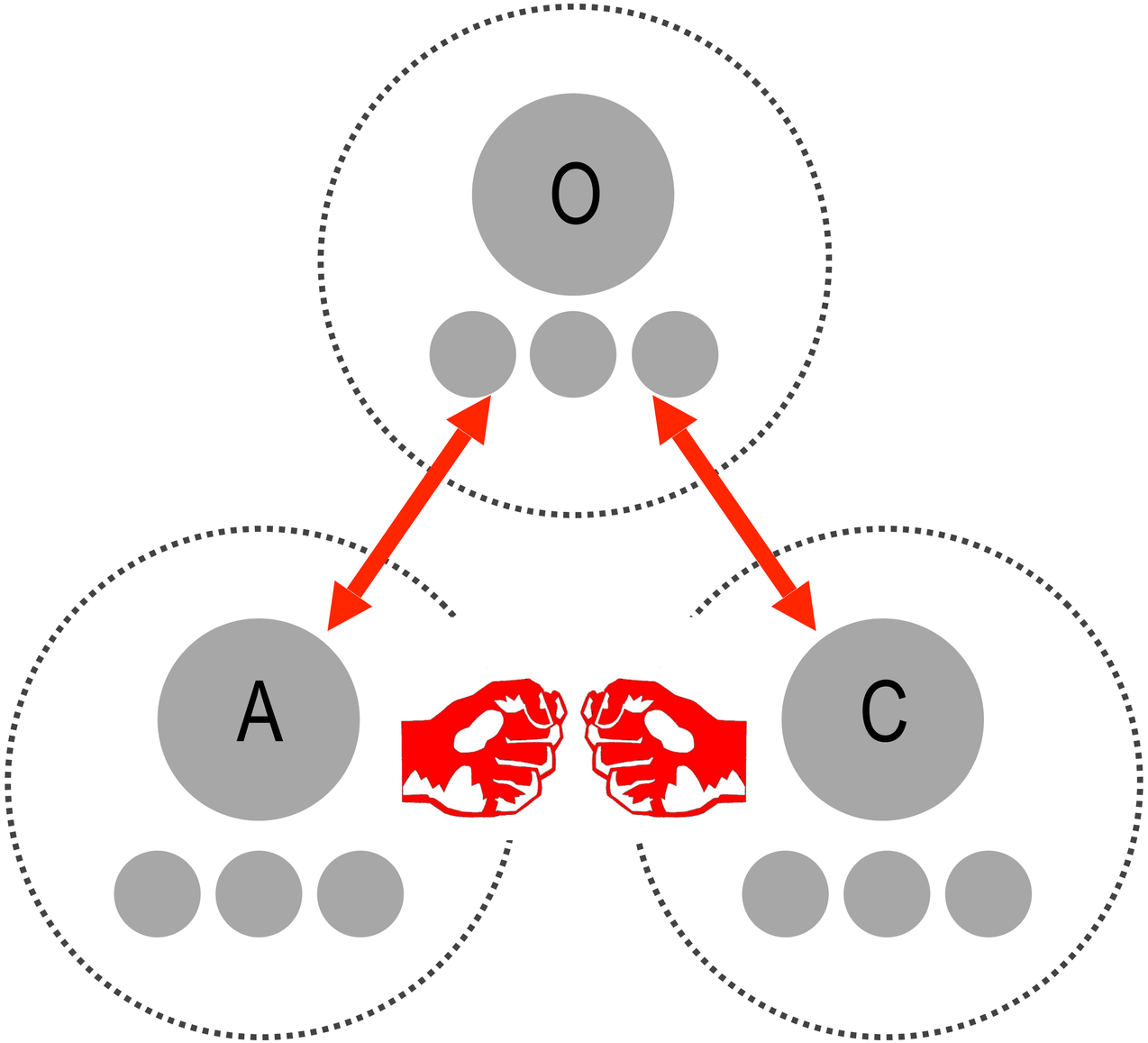
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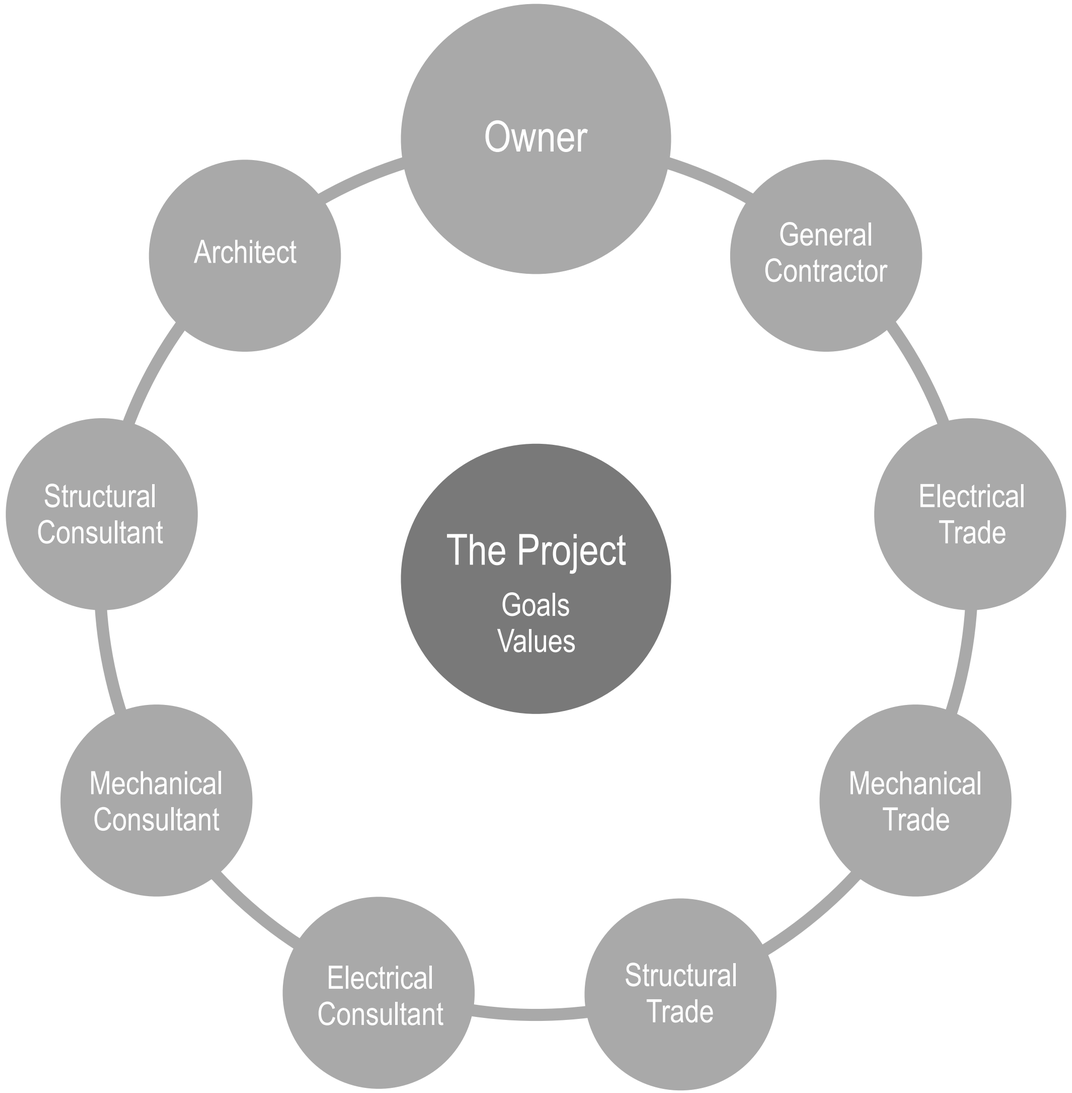

Owner
General Contractor
Electrical Trade
Mechanical Trade
Structural Trade
Electrical Consultant
Mechanical Consultant
Structural Consultant
Architect
The Project
Goals
Values

integrated project delivery guide | 2007.11.05

contractual principles

Key Participants Bound Together as Equals
Shared Financial Risk and Reward Based on Project Outcome
Liability Waivers between Key Participants
Fiscal Transparency between Key Participants
Early Involvement of Key Participants
Intensified Design
Jointly Developed Project Target Criteria
Collaborative Decision Making

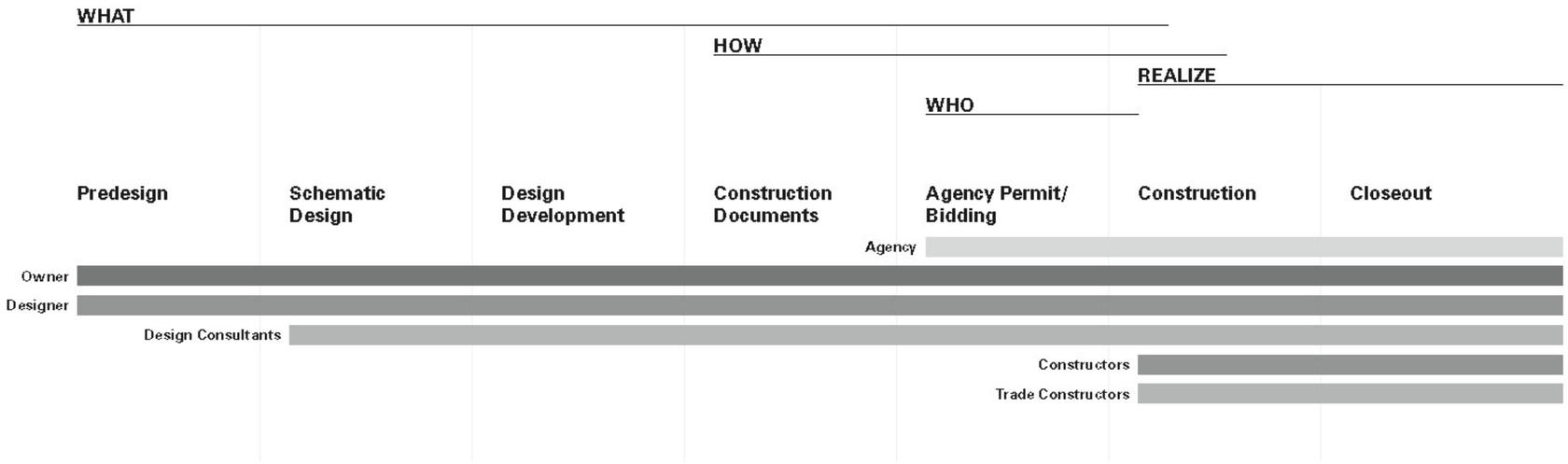
behavioral principles

Mutual Respect and Trust
Willingness to Collaborate
Open Communication

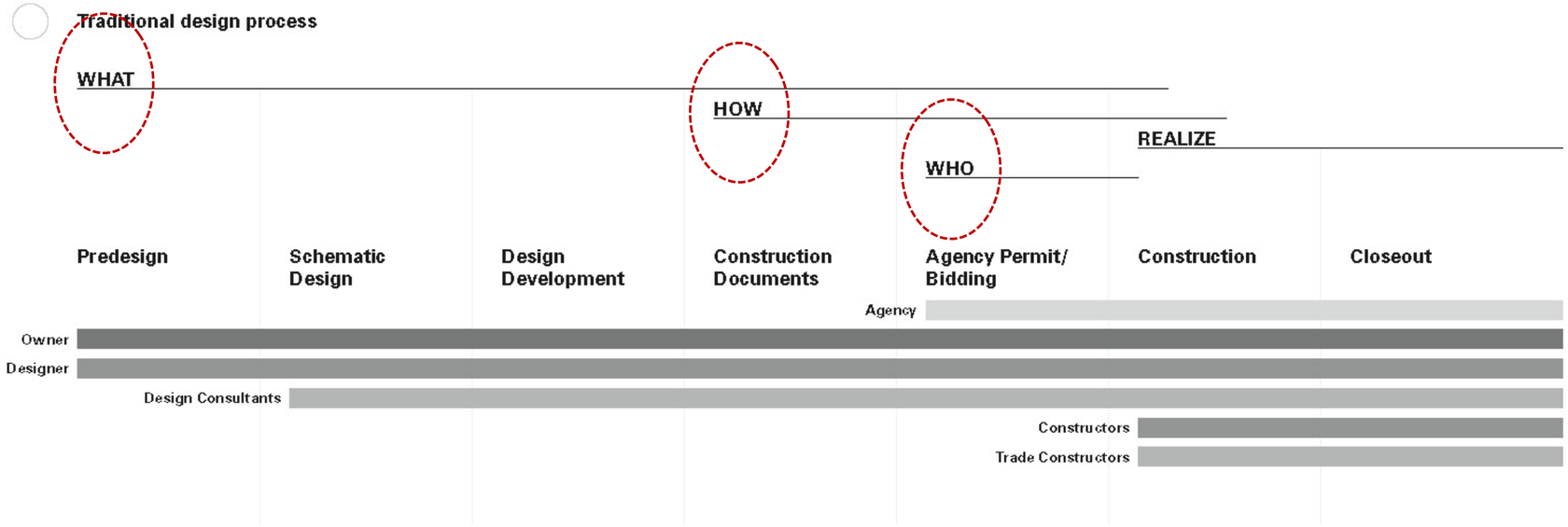
catalysts for IPD

Multi Party Agreement
Building Information Modeling
Lean Design and Construction

Traditional design process



Diagrams from AIA/AIACC's 2007 "Integrated Project Delivery: A Guide



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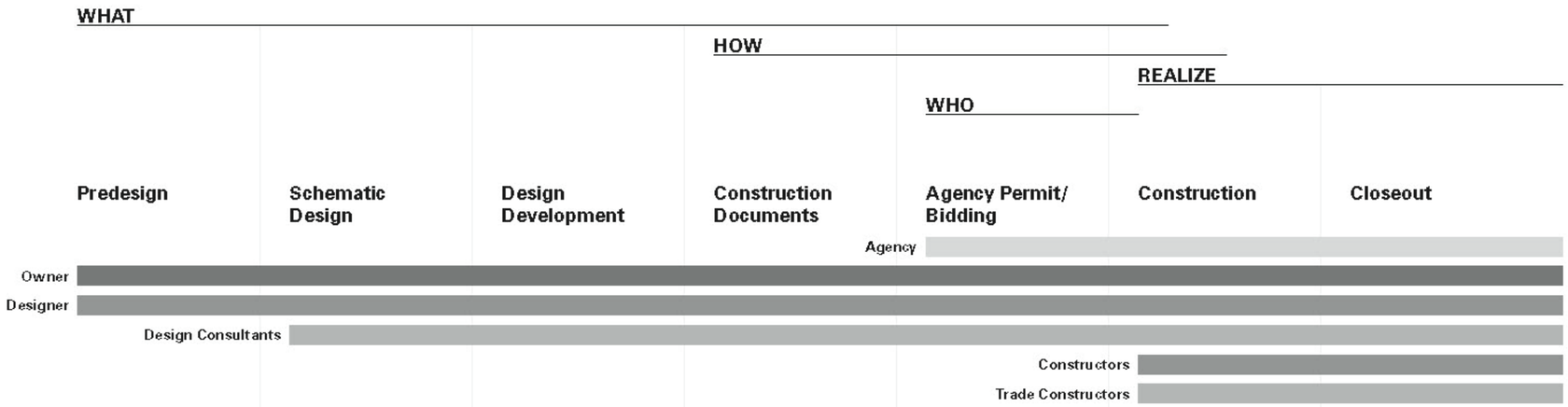
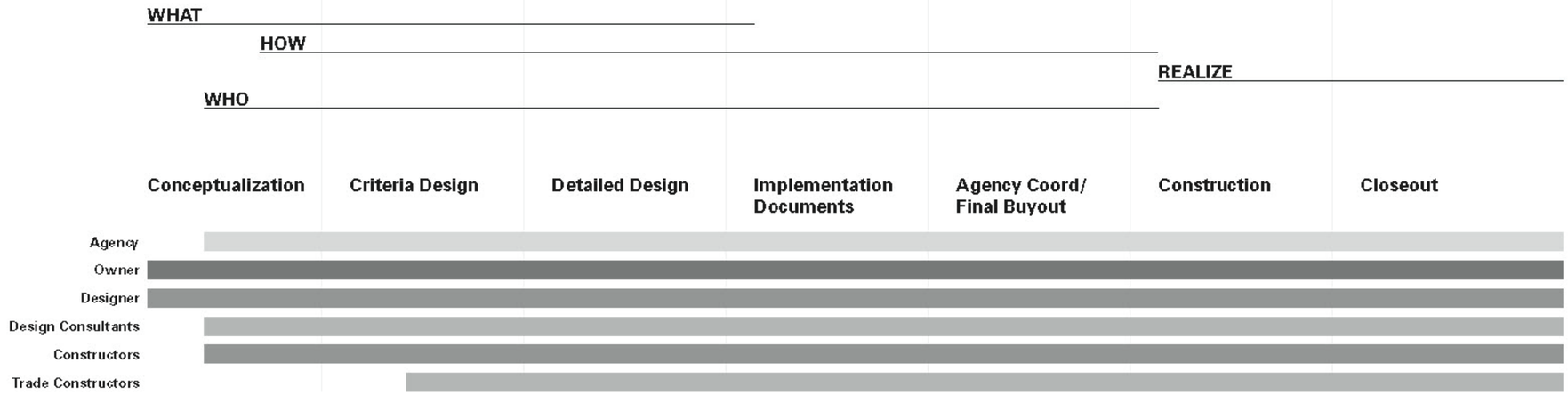
Traditional design process



Integrated design process



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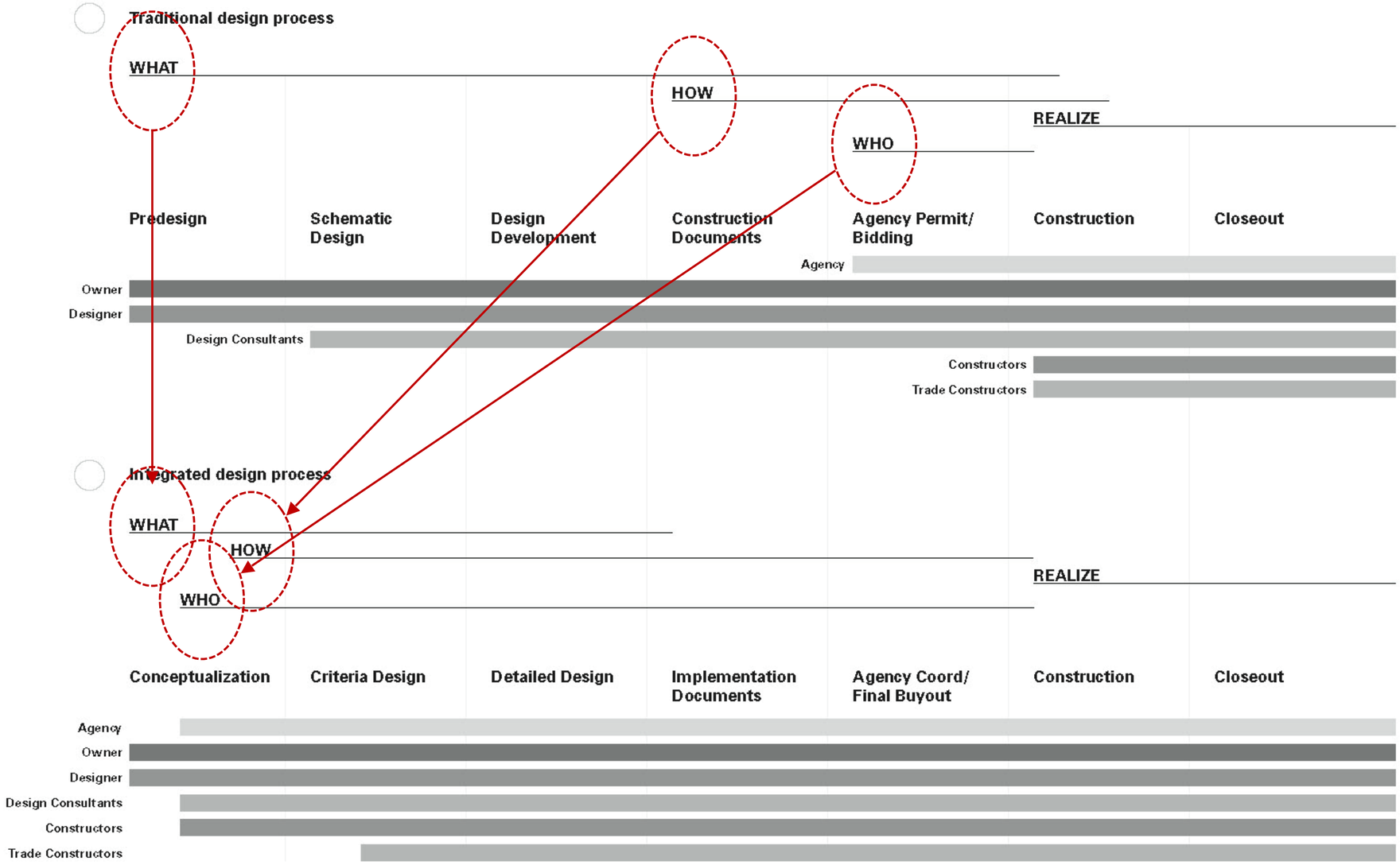

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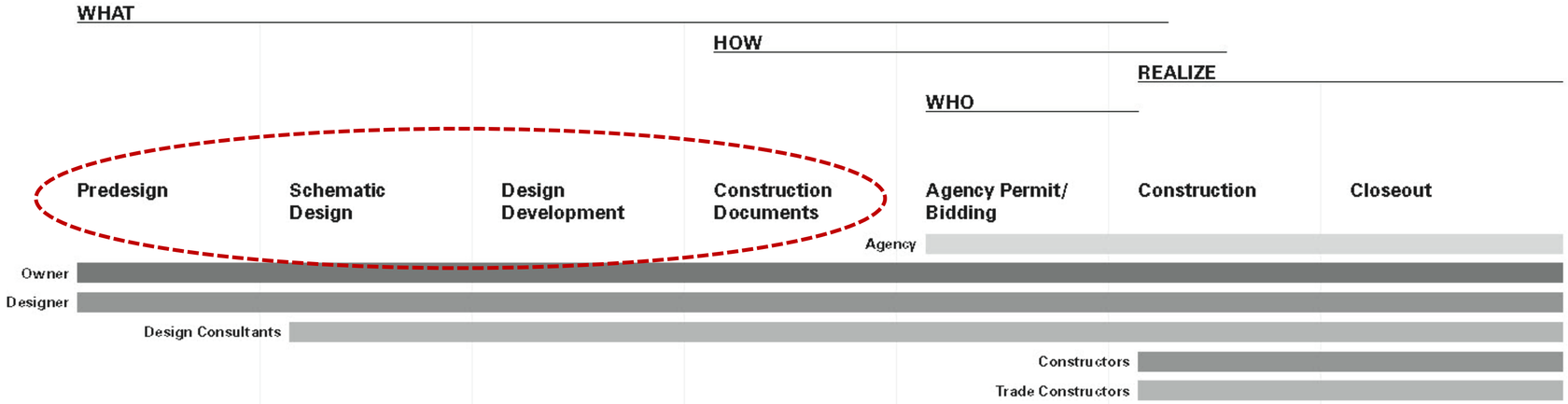
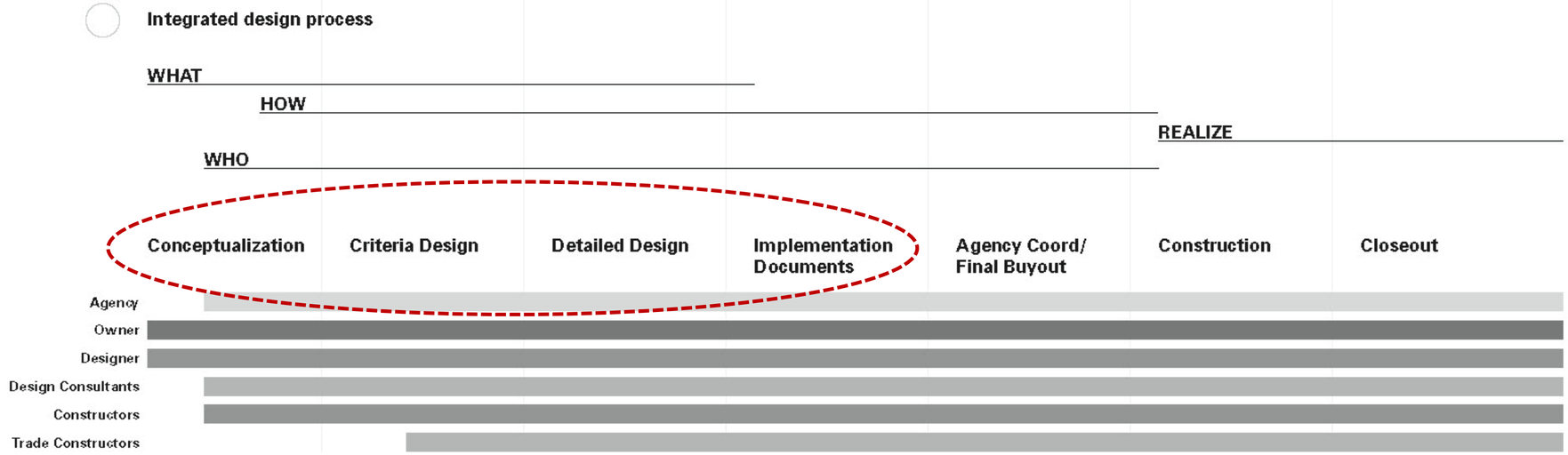
Traditional design process



Integrated design process



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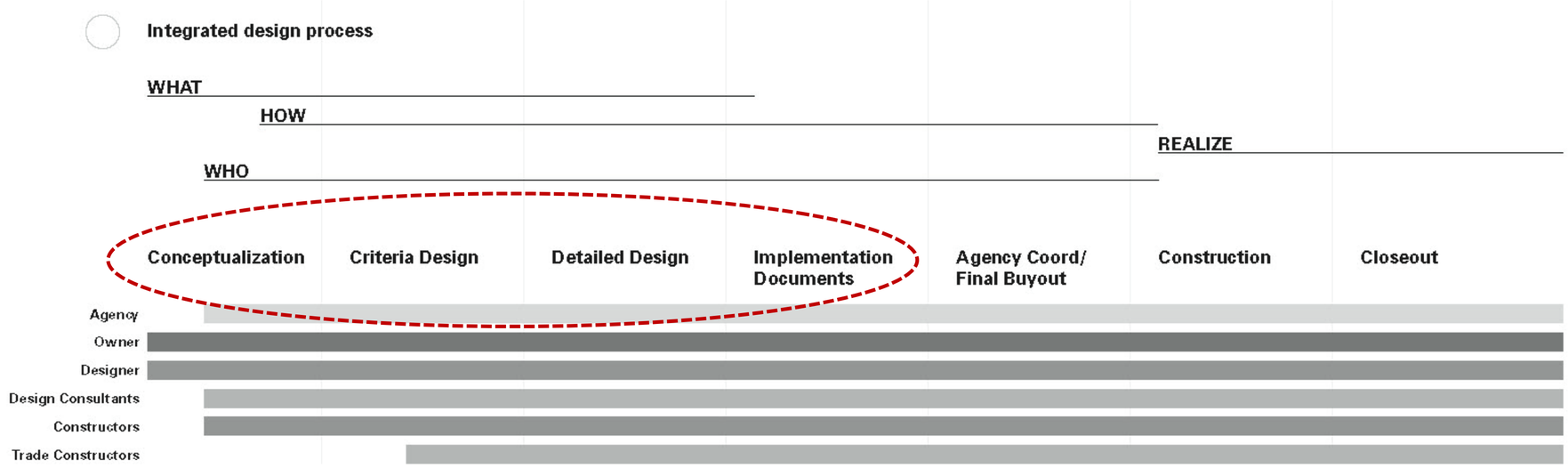

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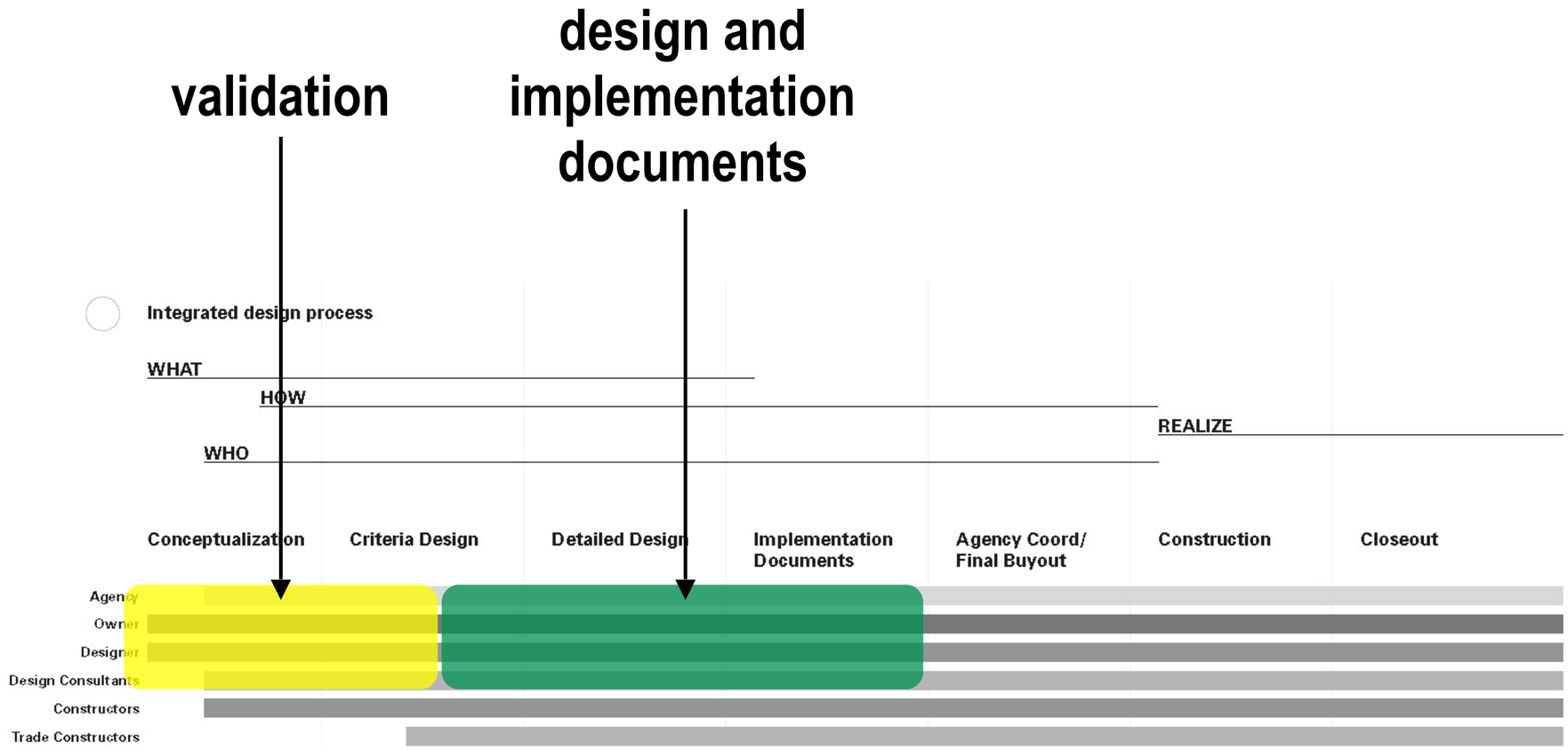
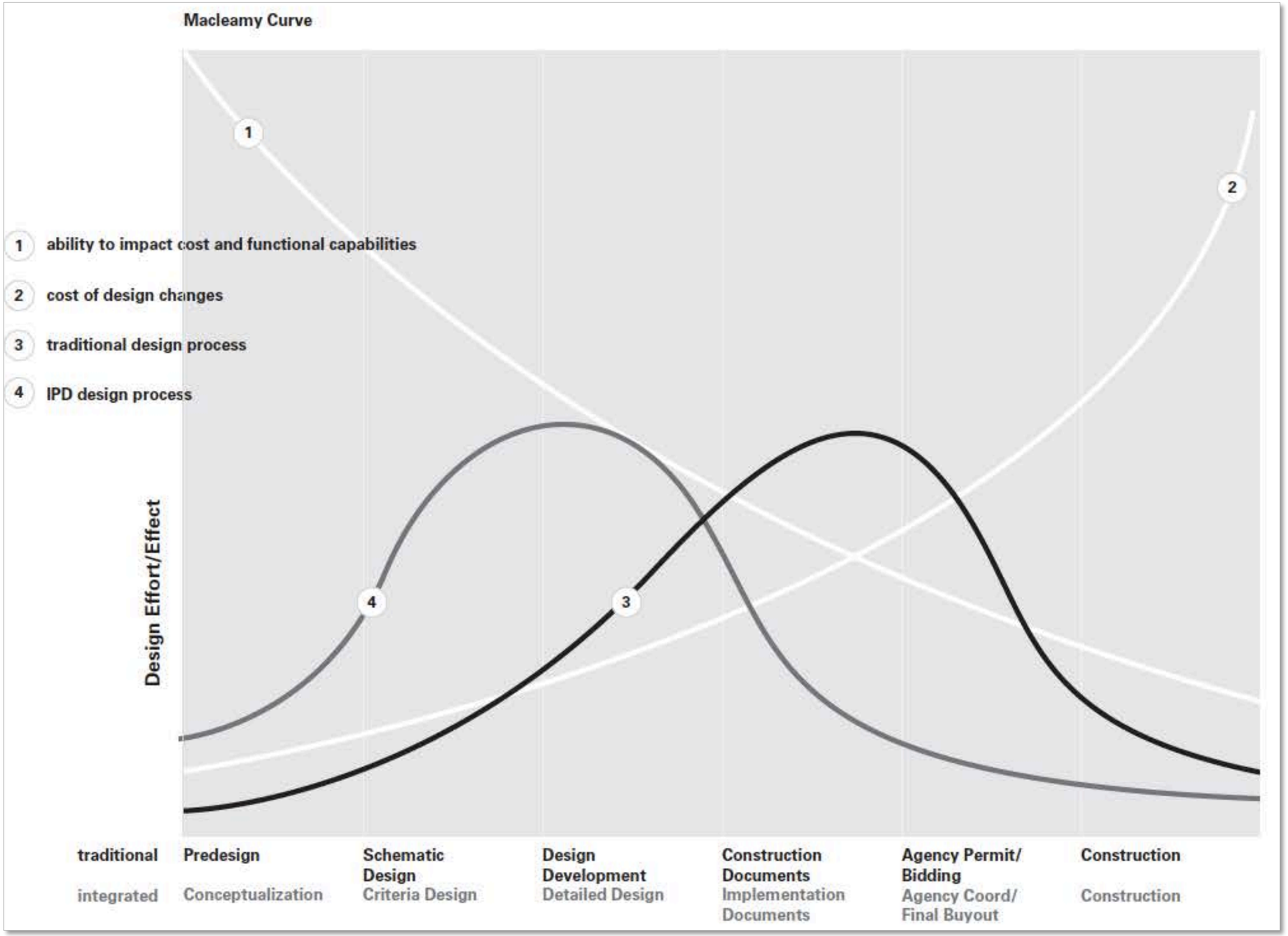


Diagrams from AIA/AIACC's 2007 "Integrated Project Delivery: A Guide

Macleamy Curve

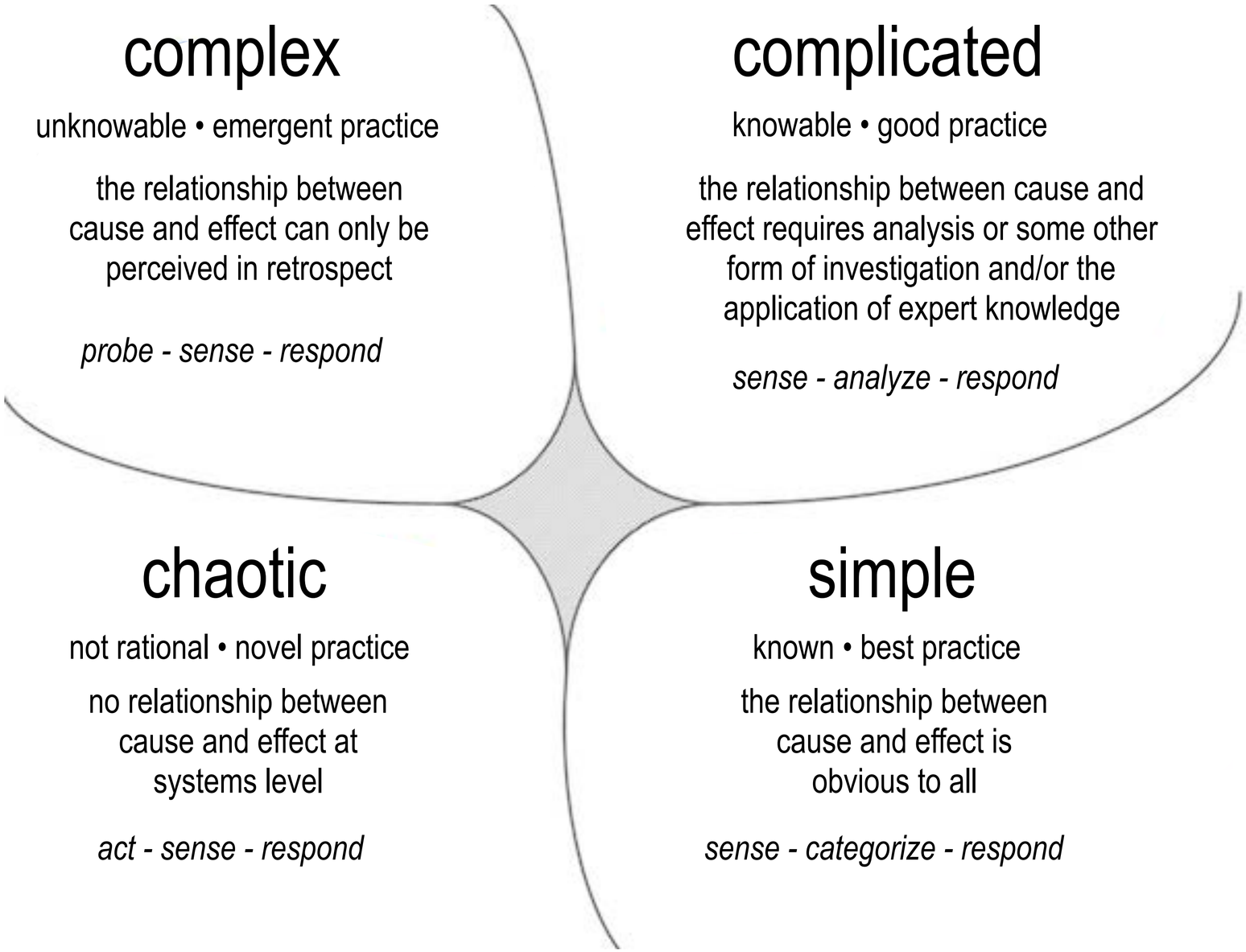


why is this a good thing?

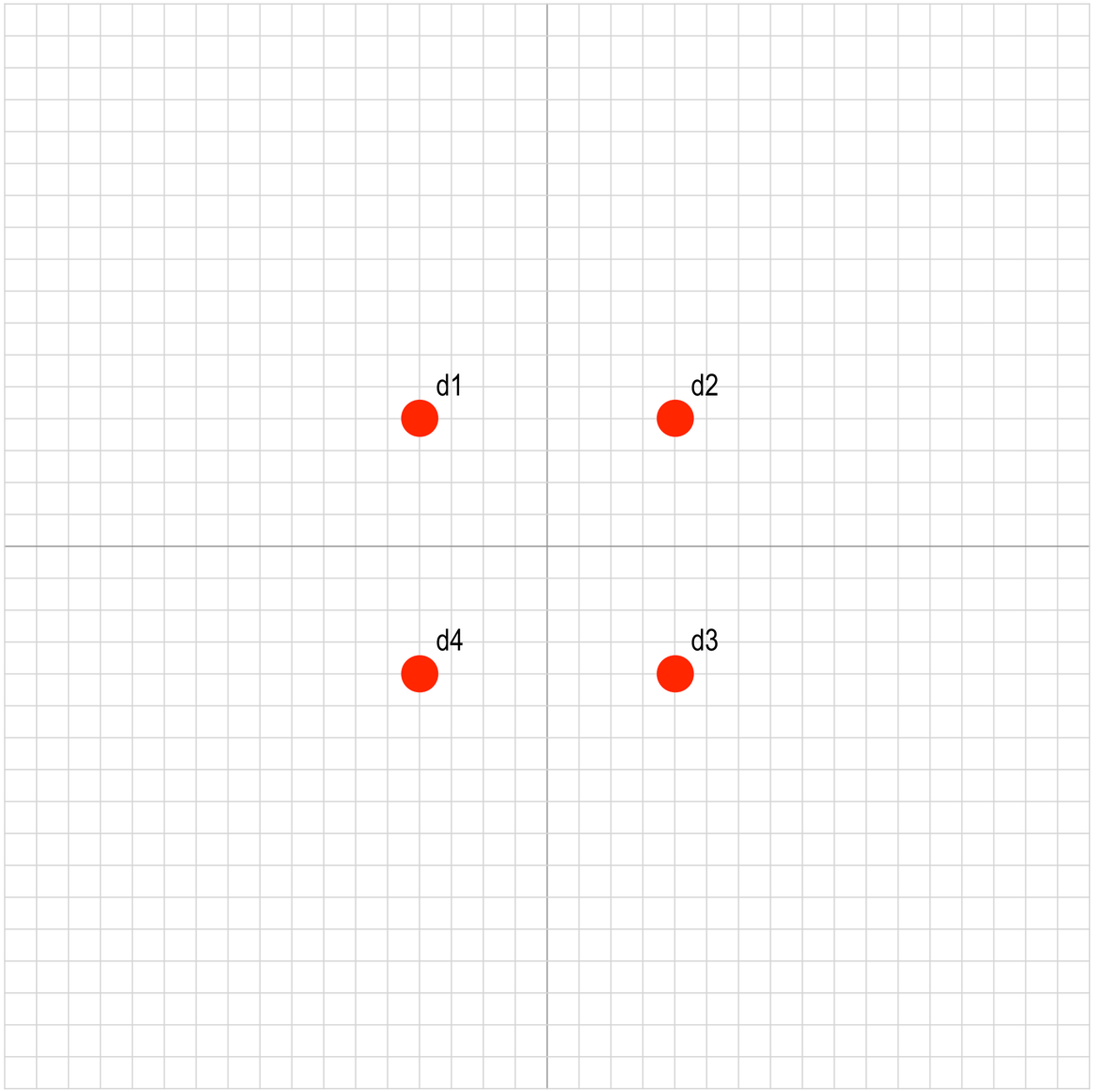
complexity

•

problems are connected

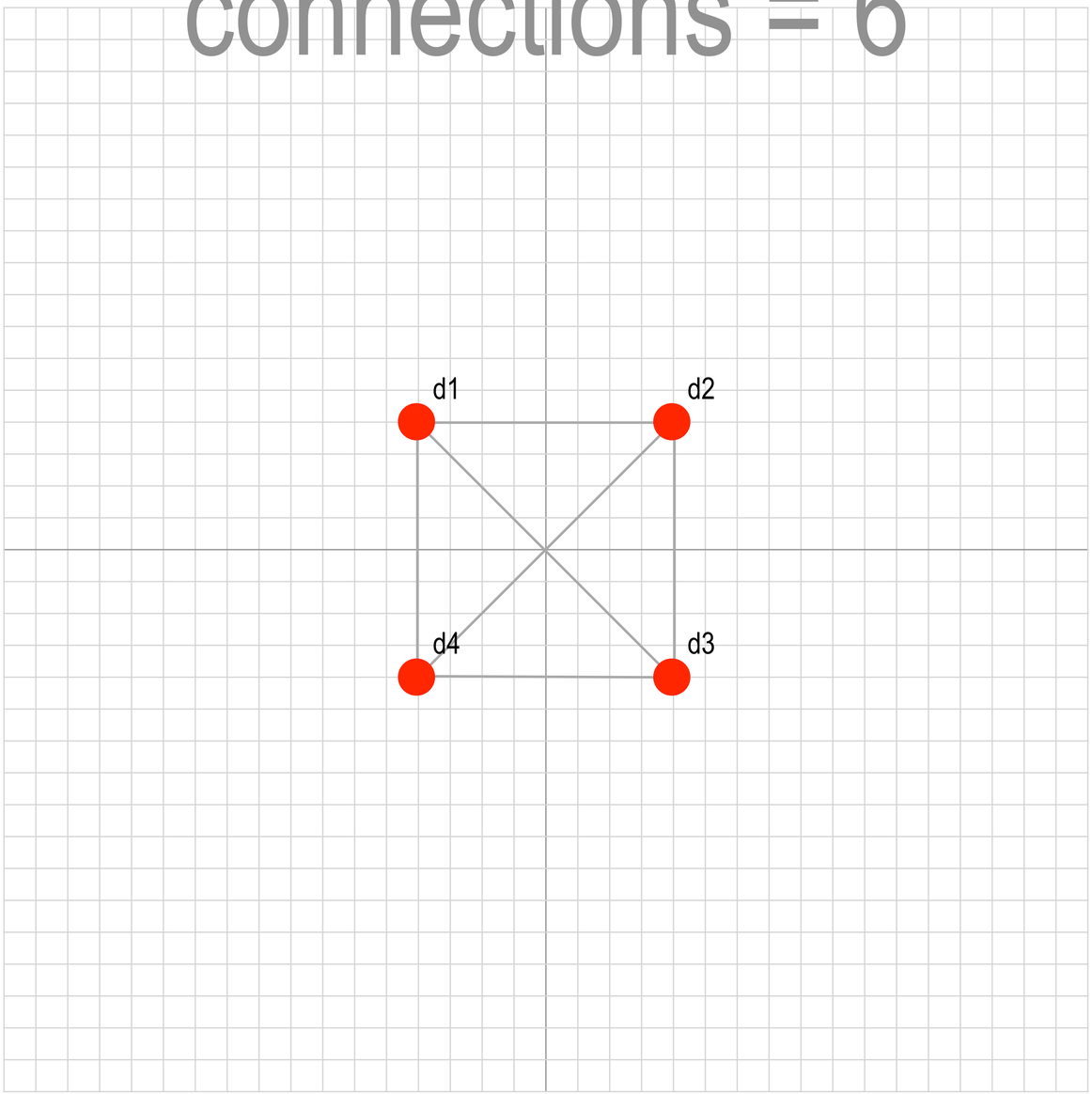


source: Dave Snowden, Cognitive Edge



source: Dave Snowden, Cognitive Edge

connections = 6



source: Dave Snowden, Cognitive Edge

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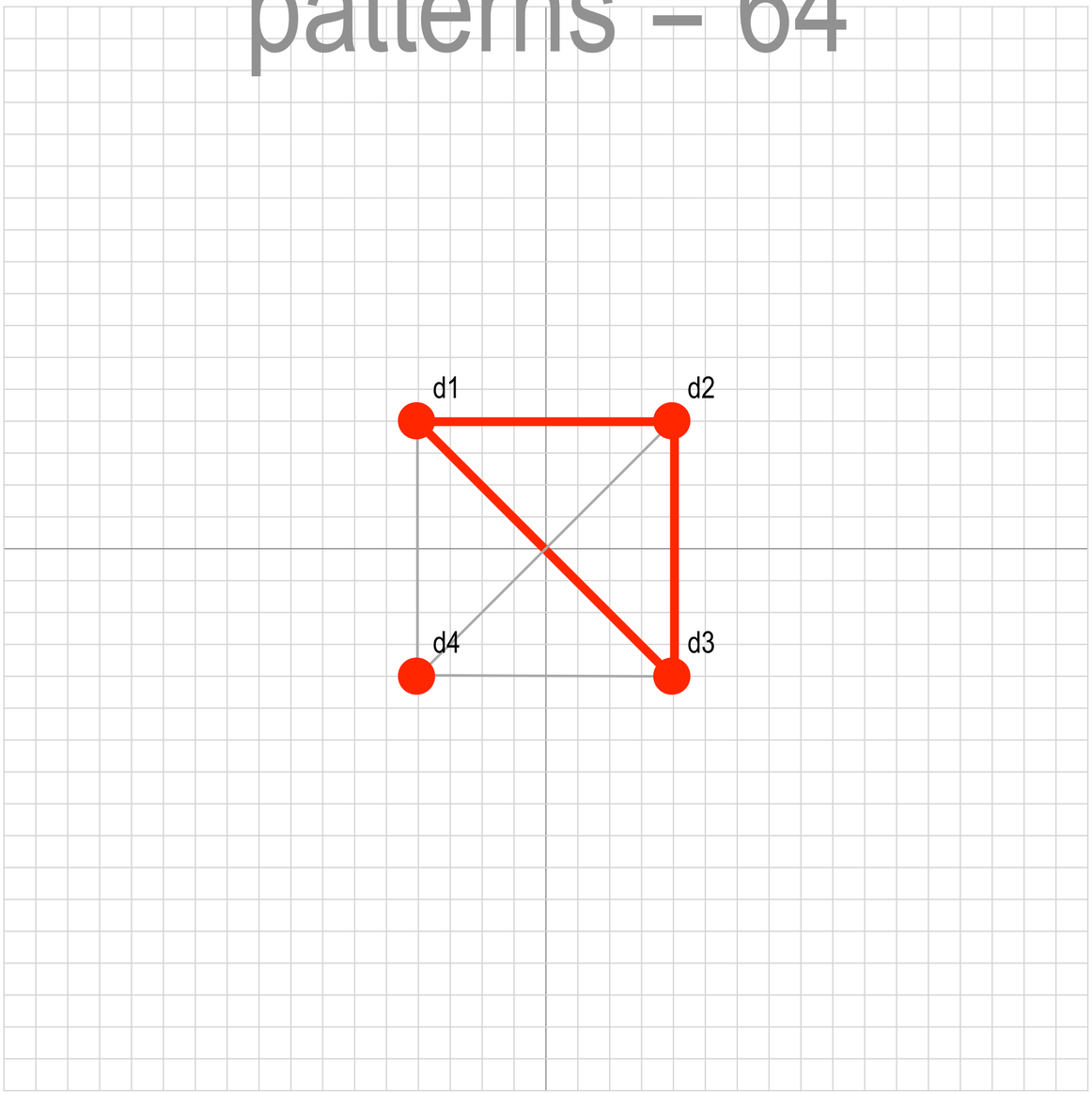
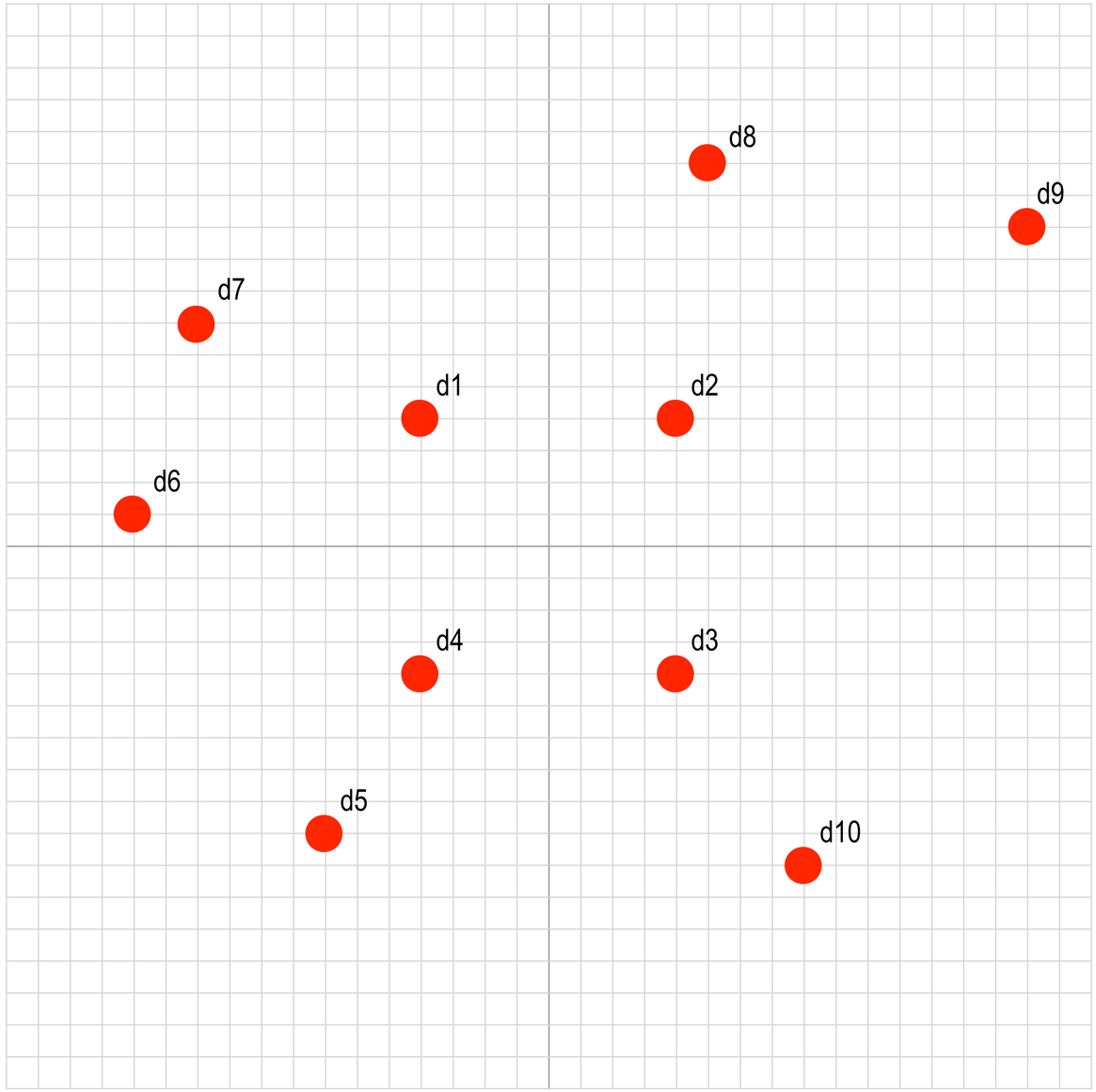


source: Dave Snowden, Cognitive Edge



source: Dave Snowden, Cognitive Edge

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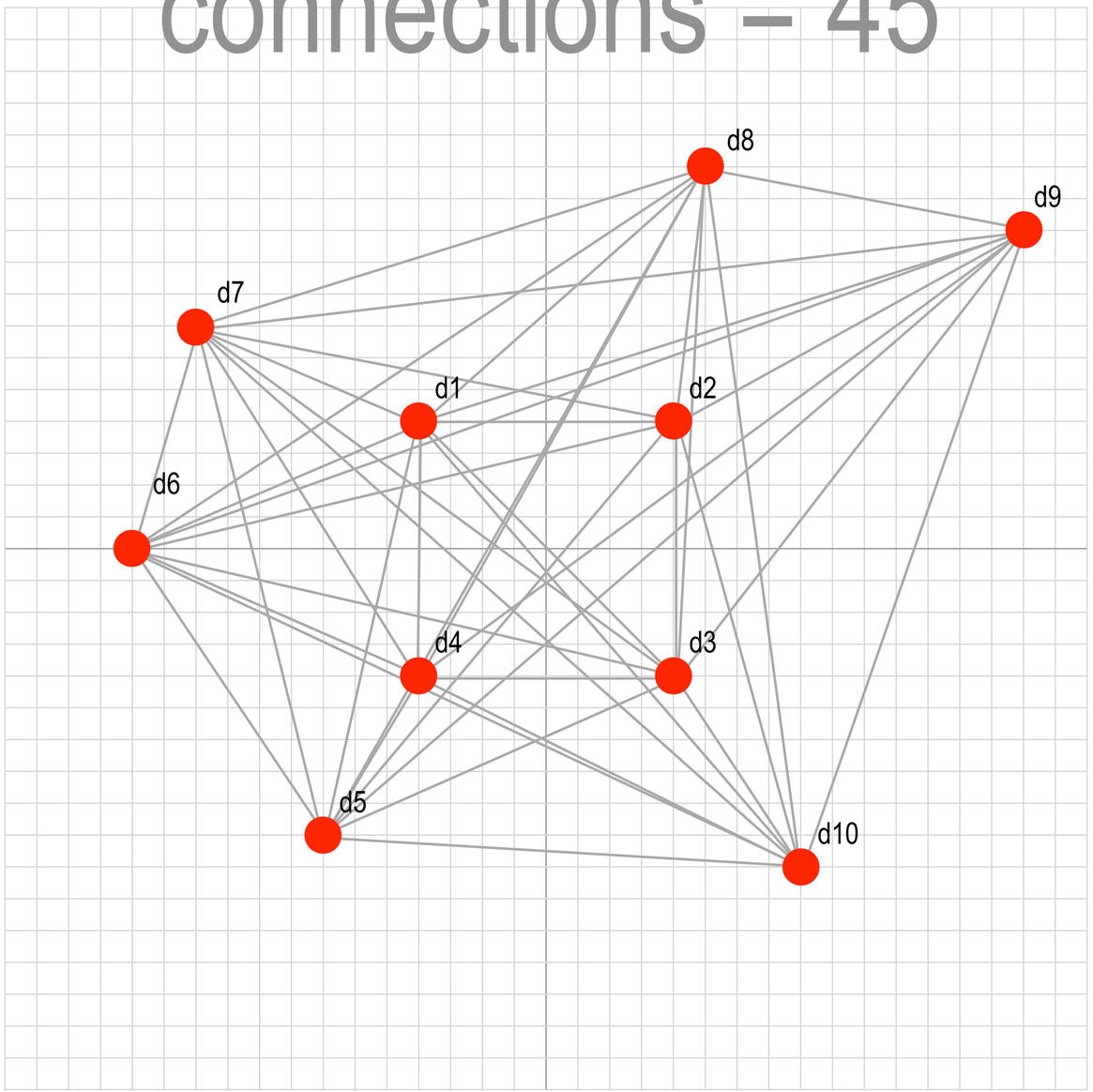
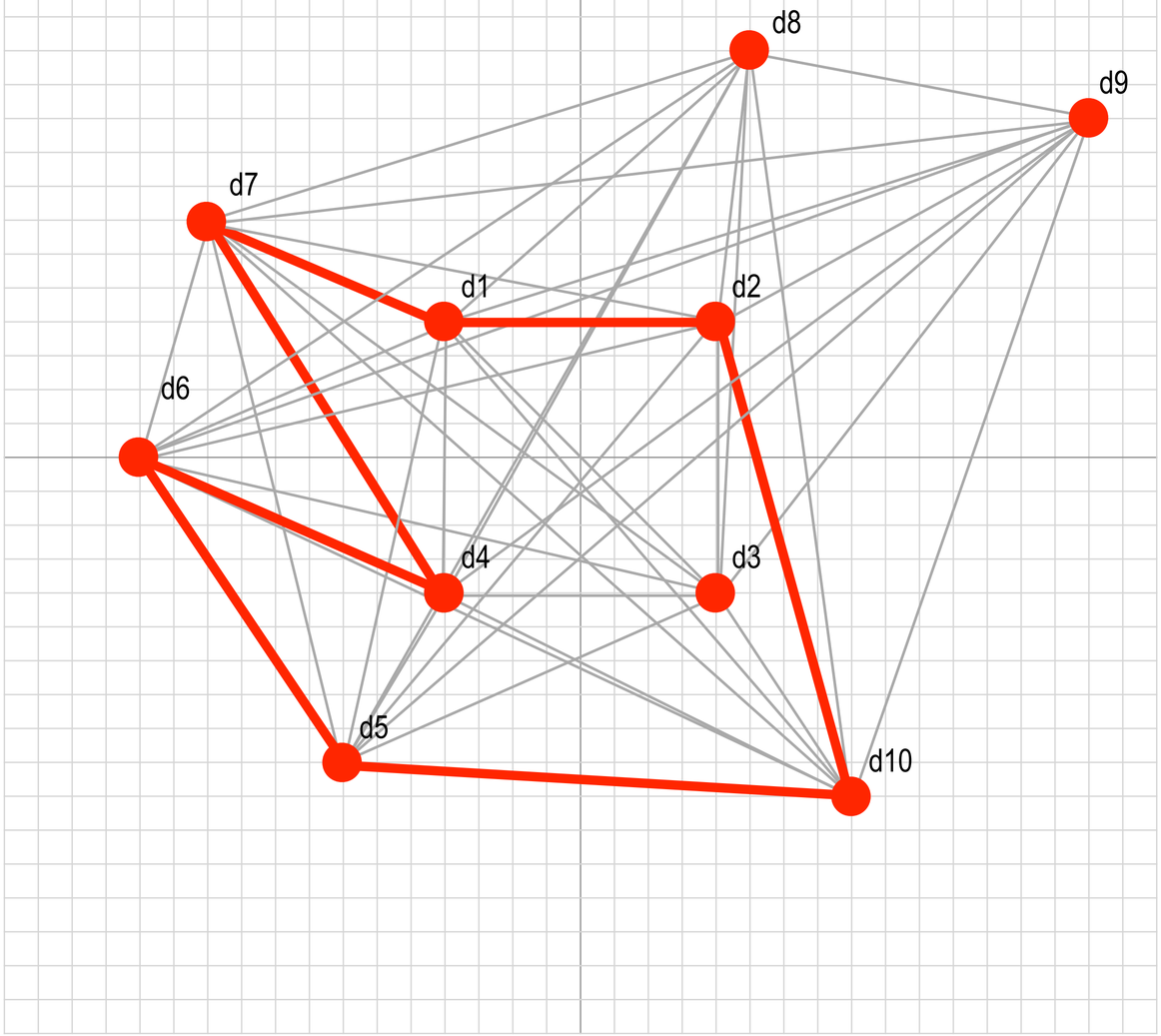


source: Dave Snowden, Cognitive Edge

patterns = 3,500,000

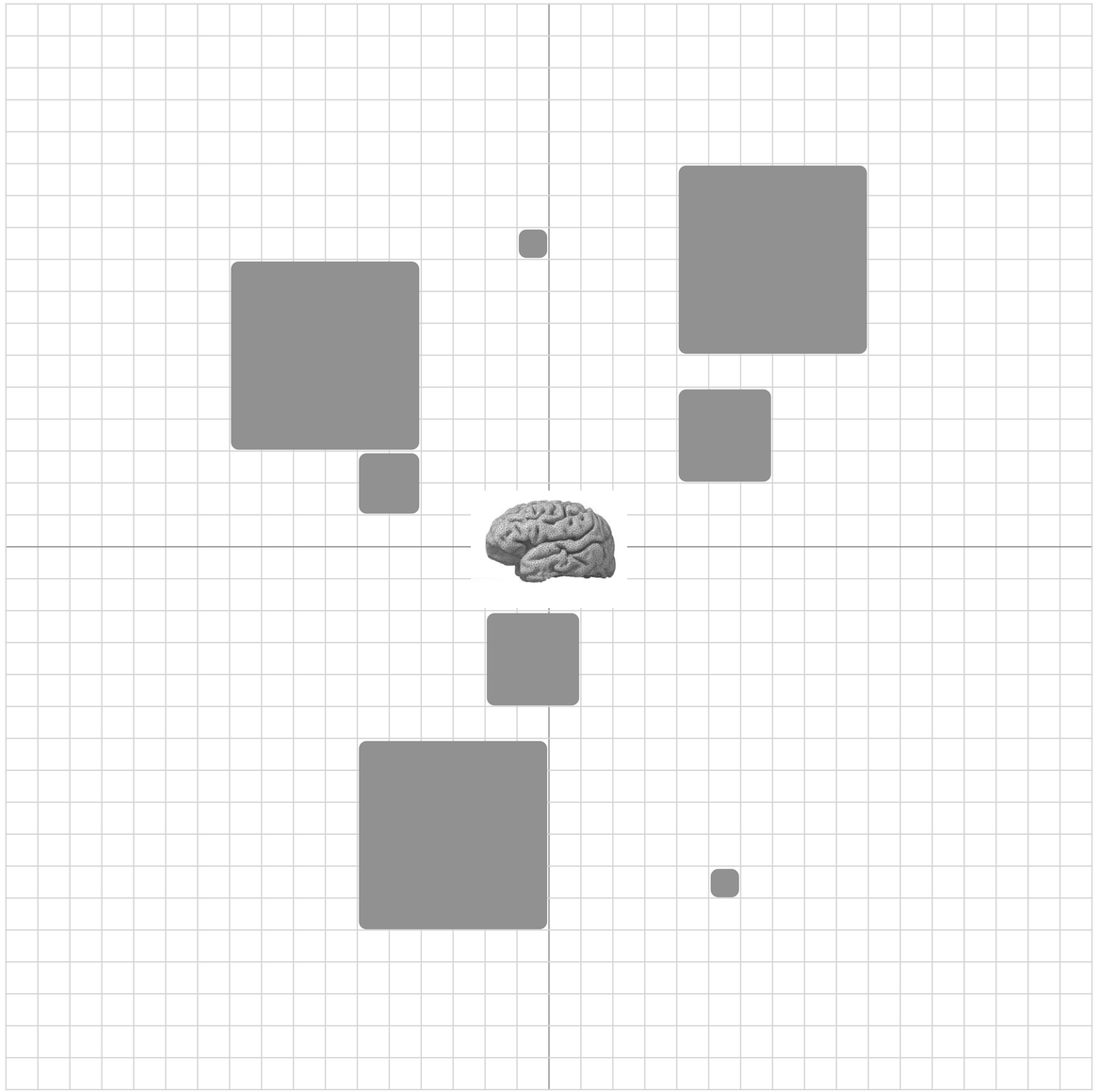


buildings

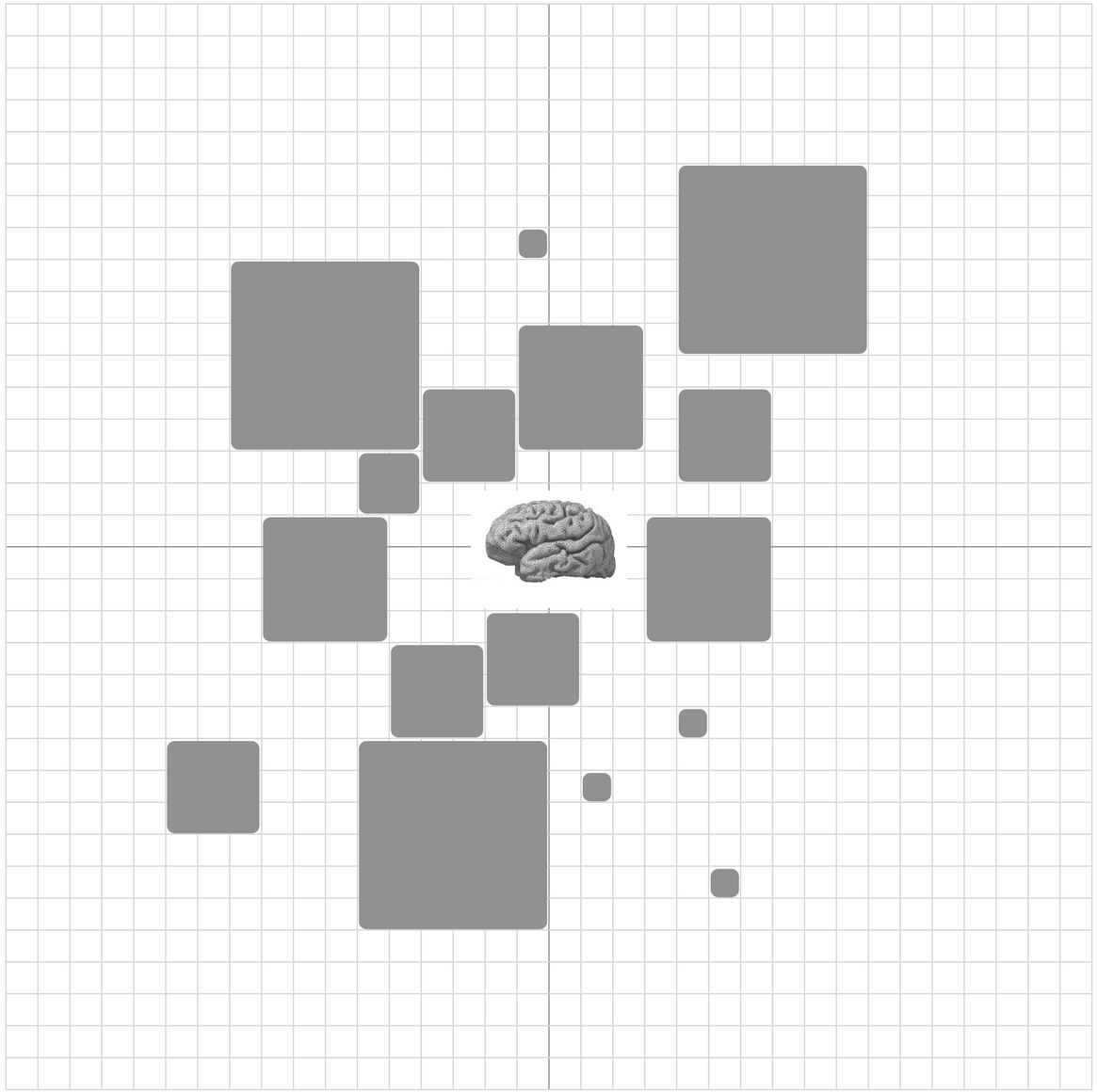
are

decisions

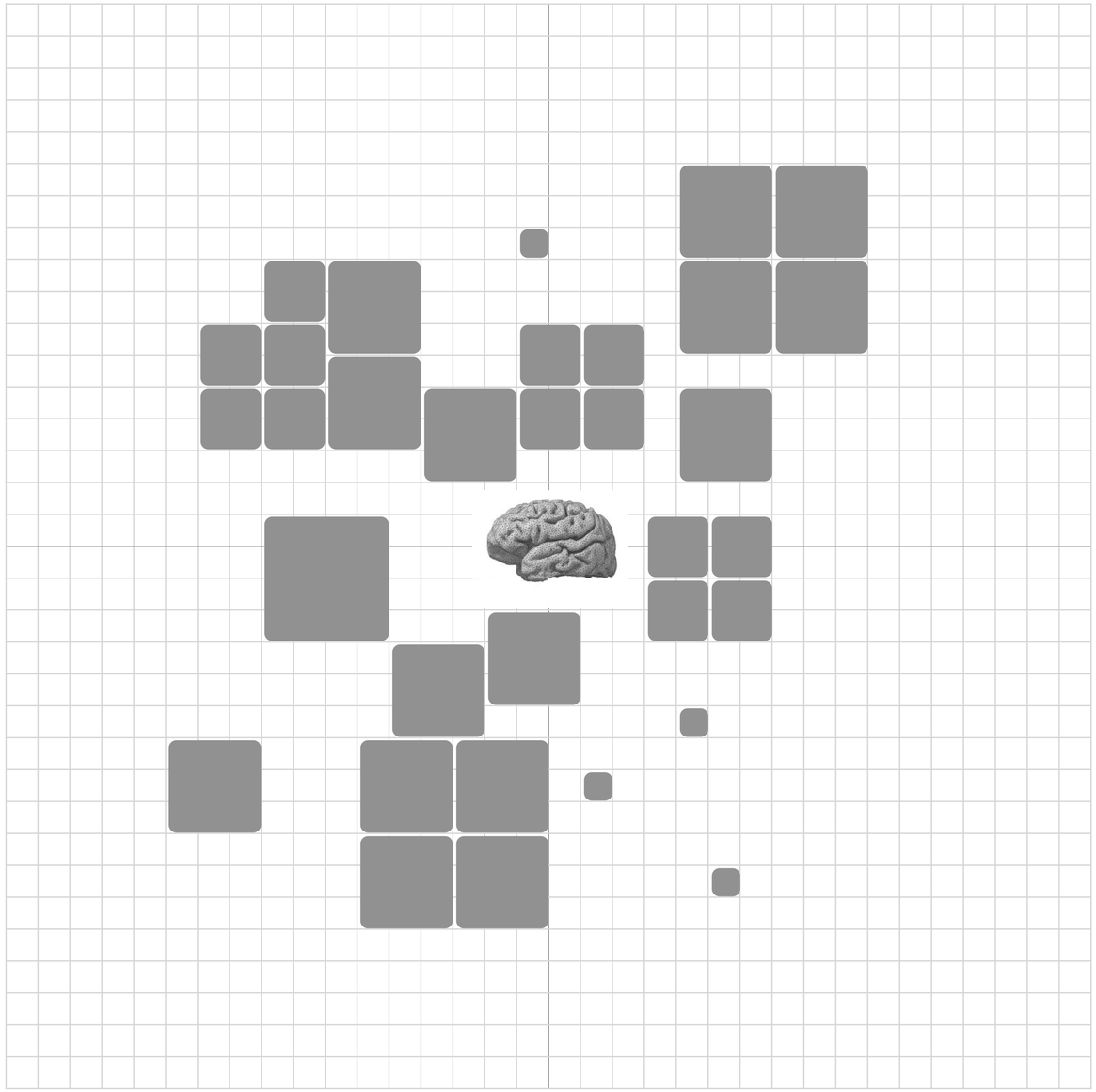
context
form
material
structure



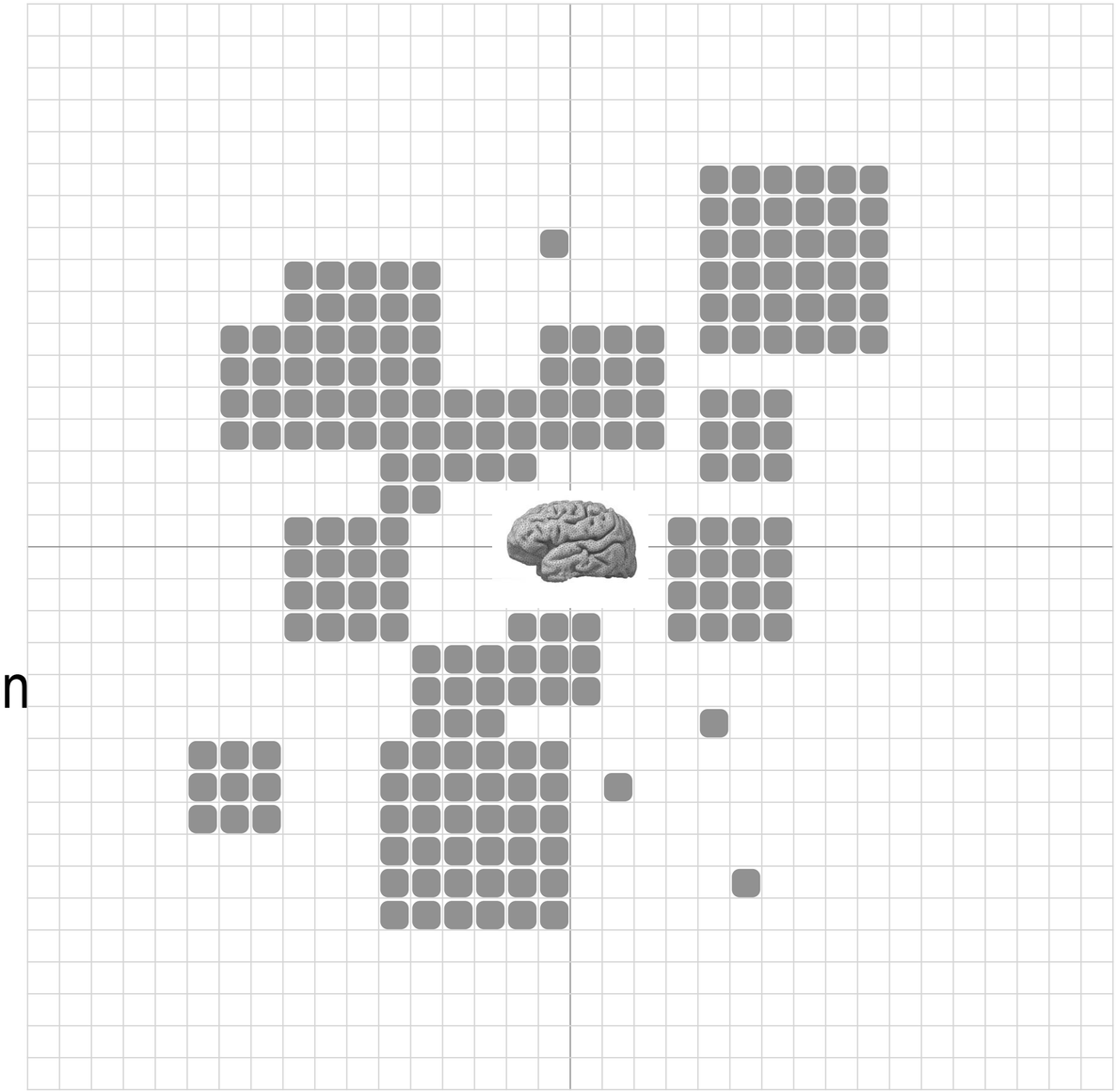
context
form
material
structure
heating
cooling



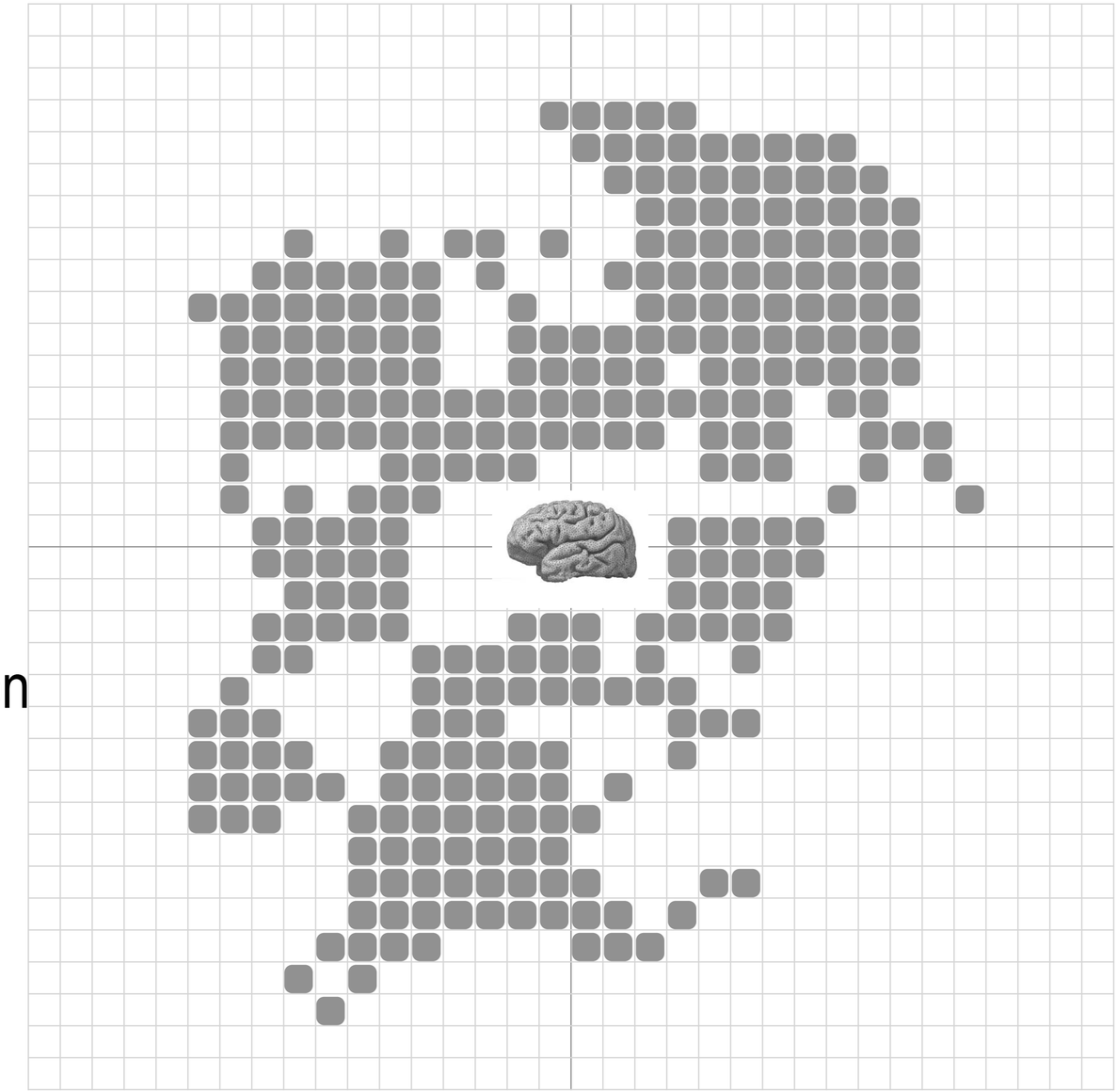
context
form
material
structure
heating
cooling
plumbing
electrical



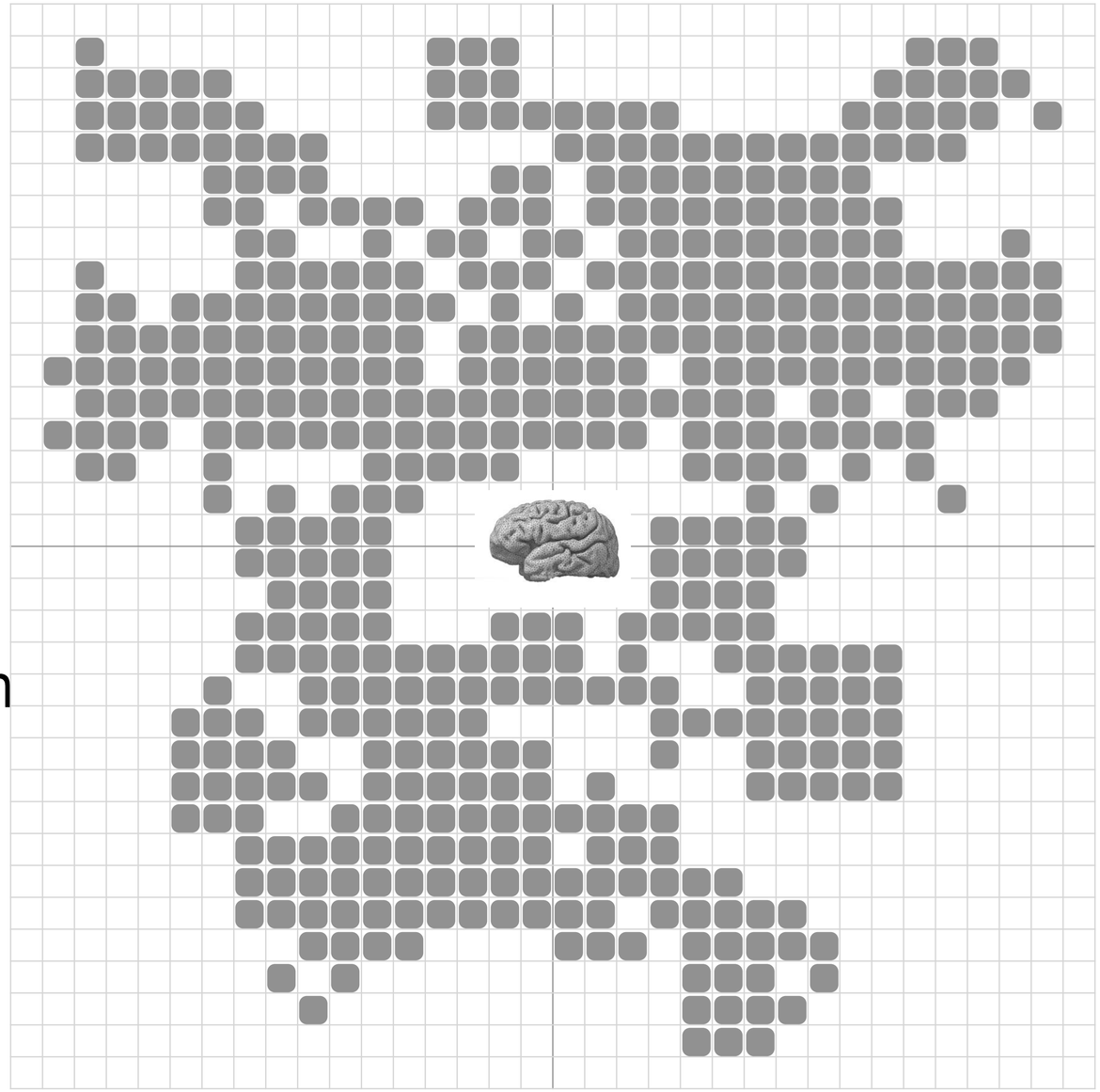
context
form
material
structure
heating
cooling
plumbing
electrical
fire protection
telephone



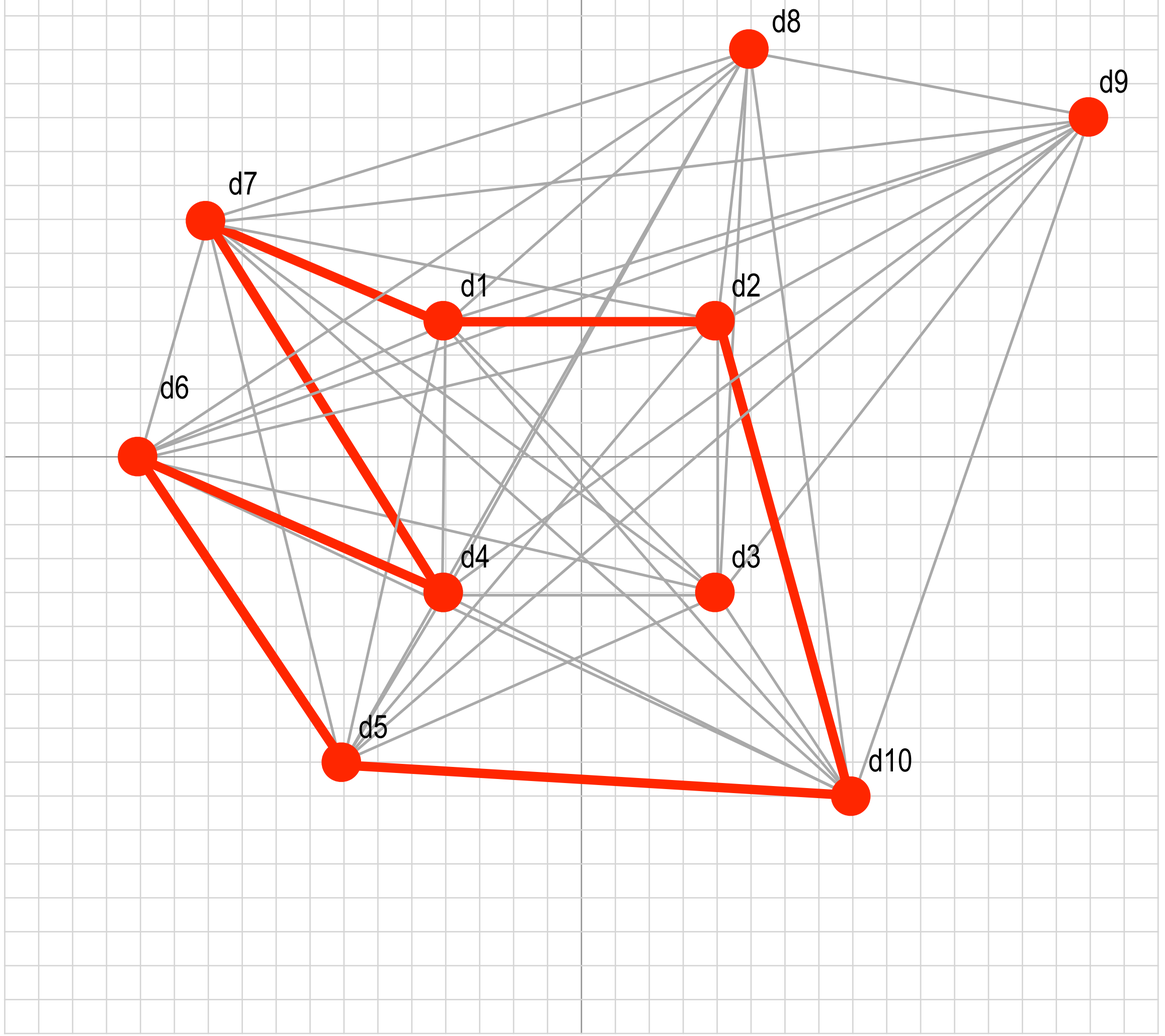
context
form
material
structure
heating
cooling
plumbing
electrical
fire protection
telephone
data
security

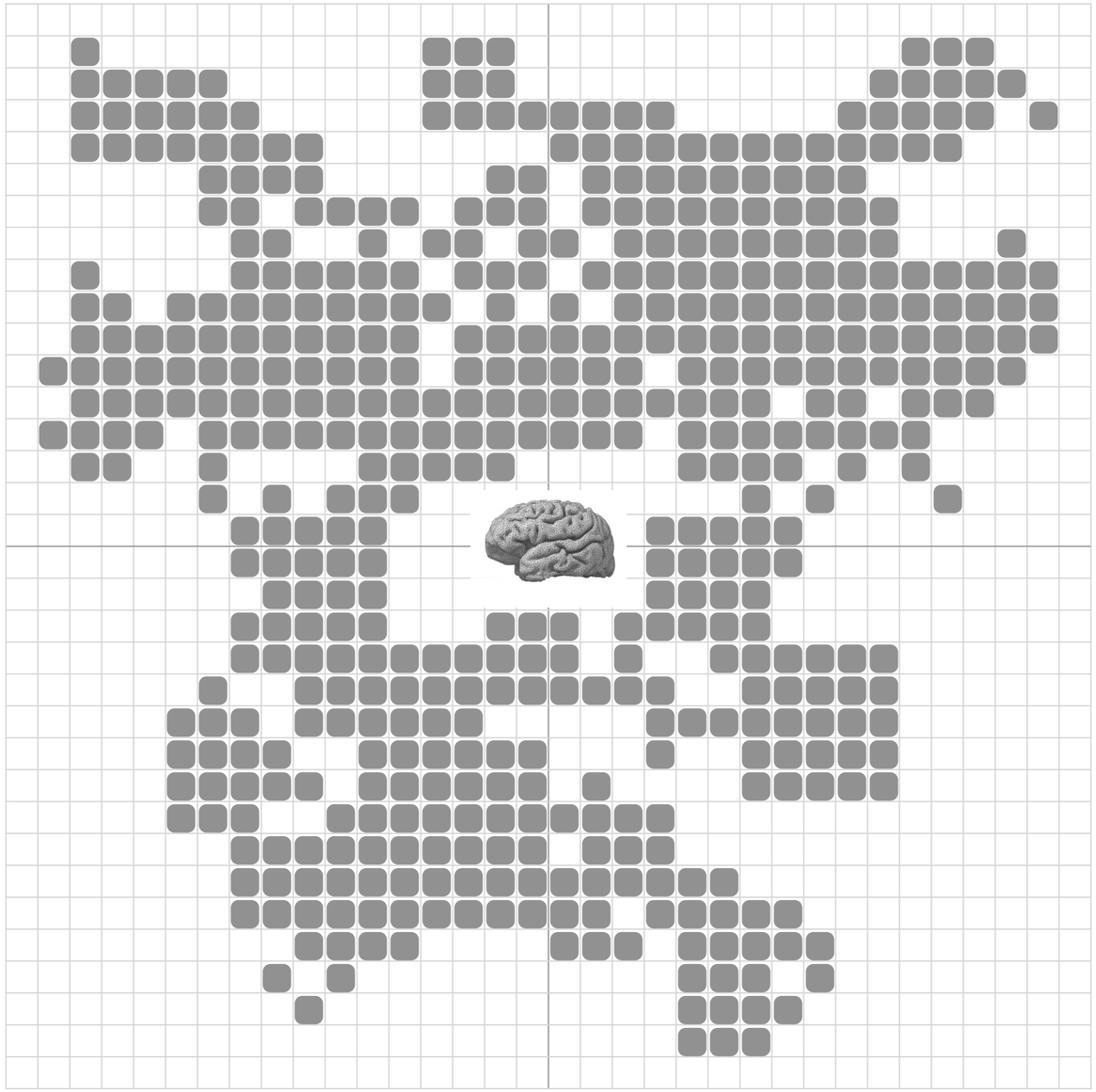


context
form
material
structure
heating
cooling
plumbing
electrical
fire protection
telephone
data
security
sustainability



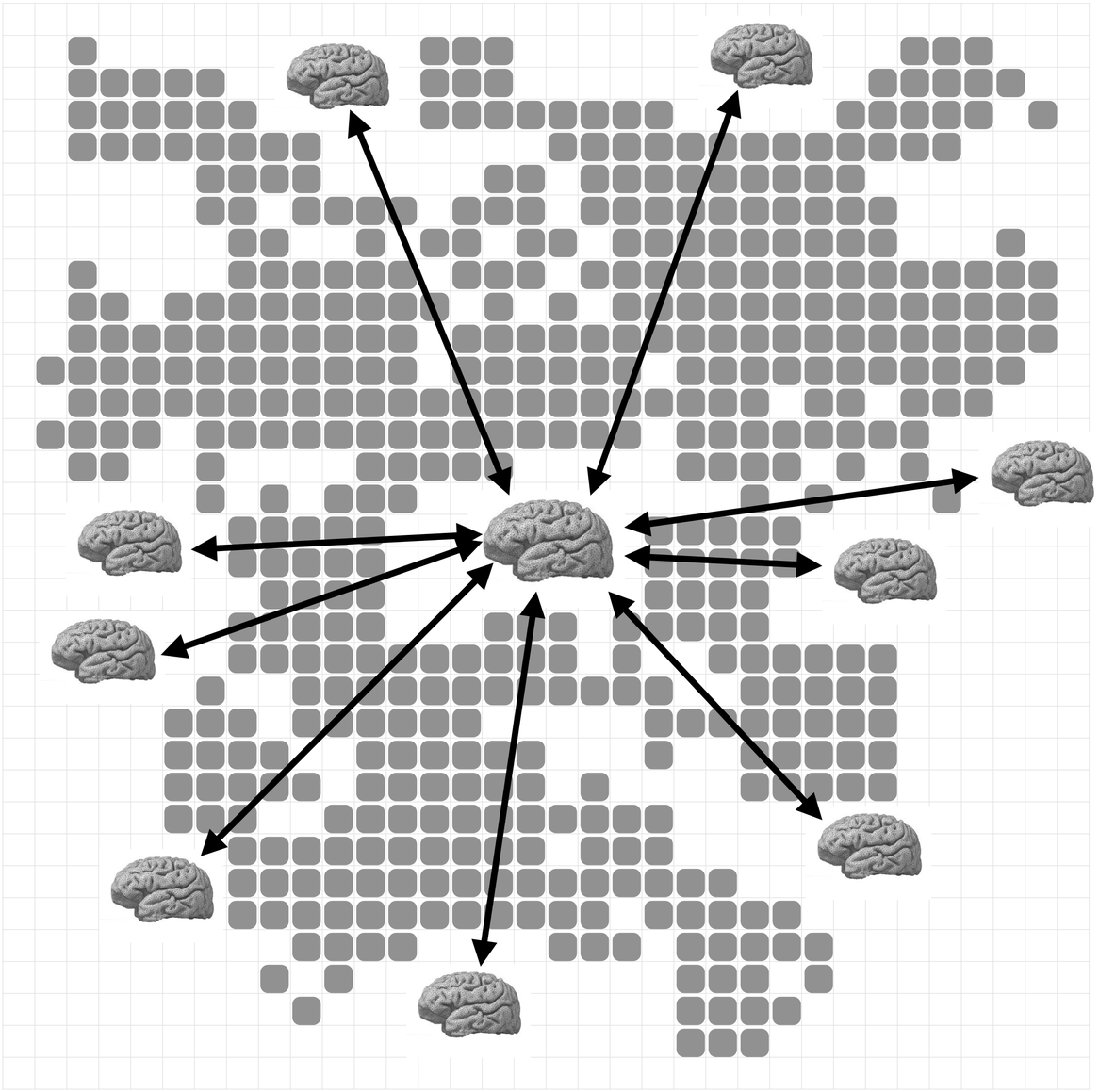
patterns = 3,500,000

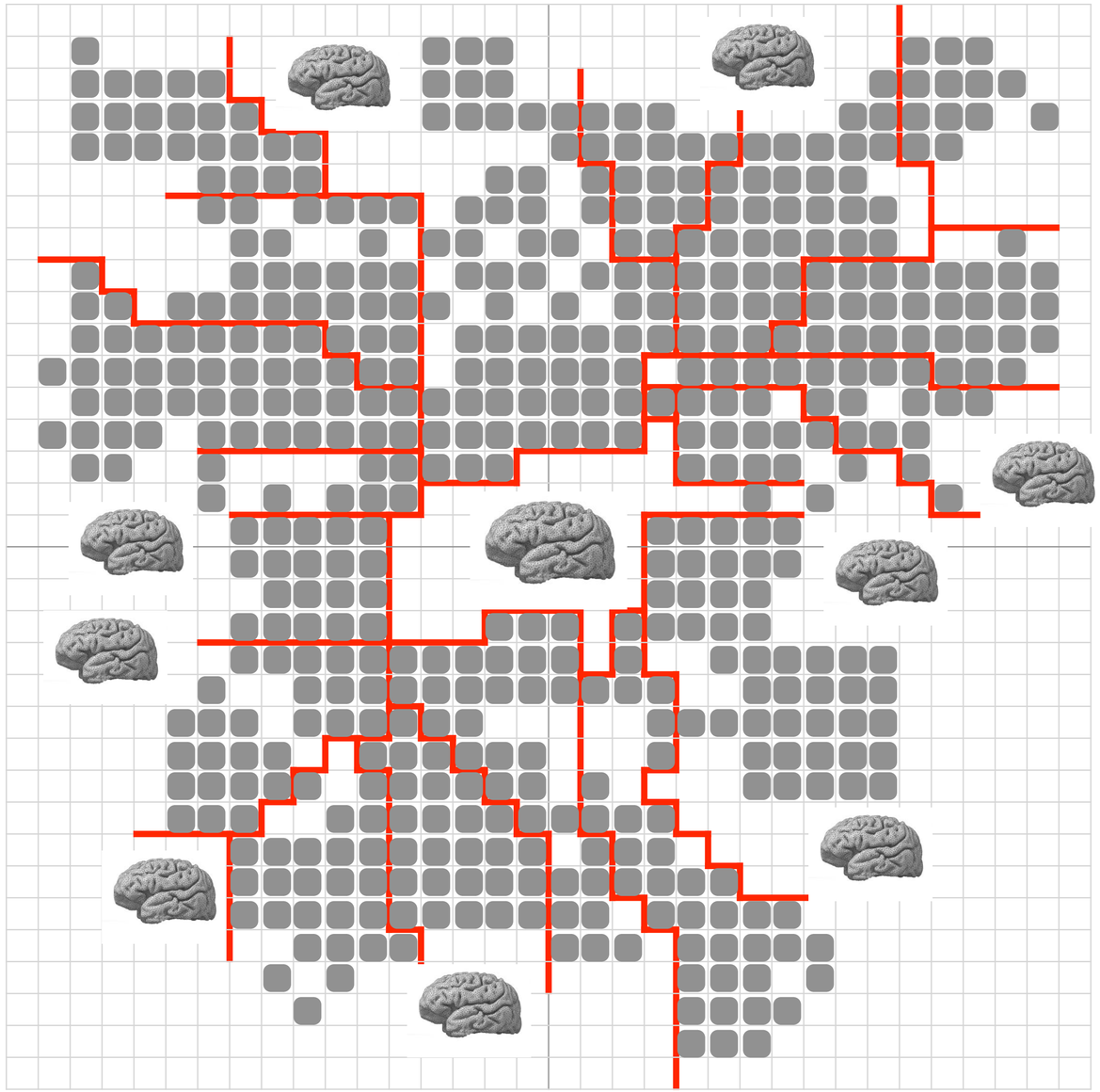


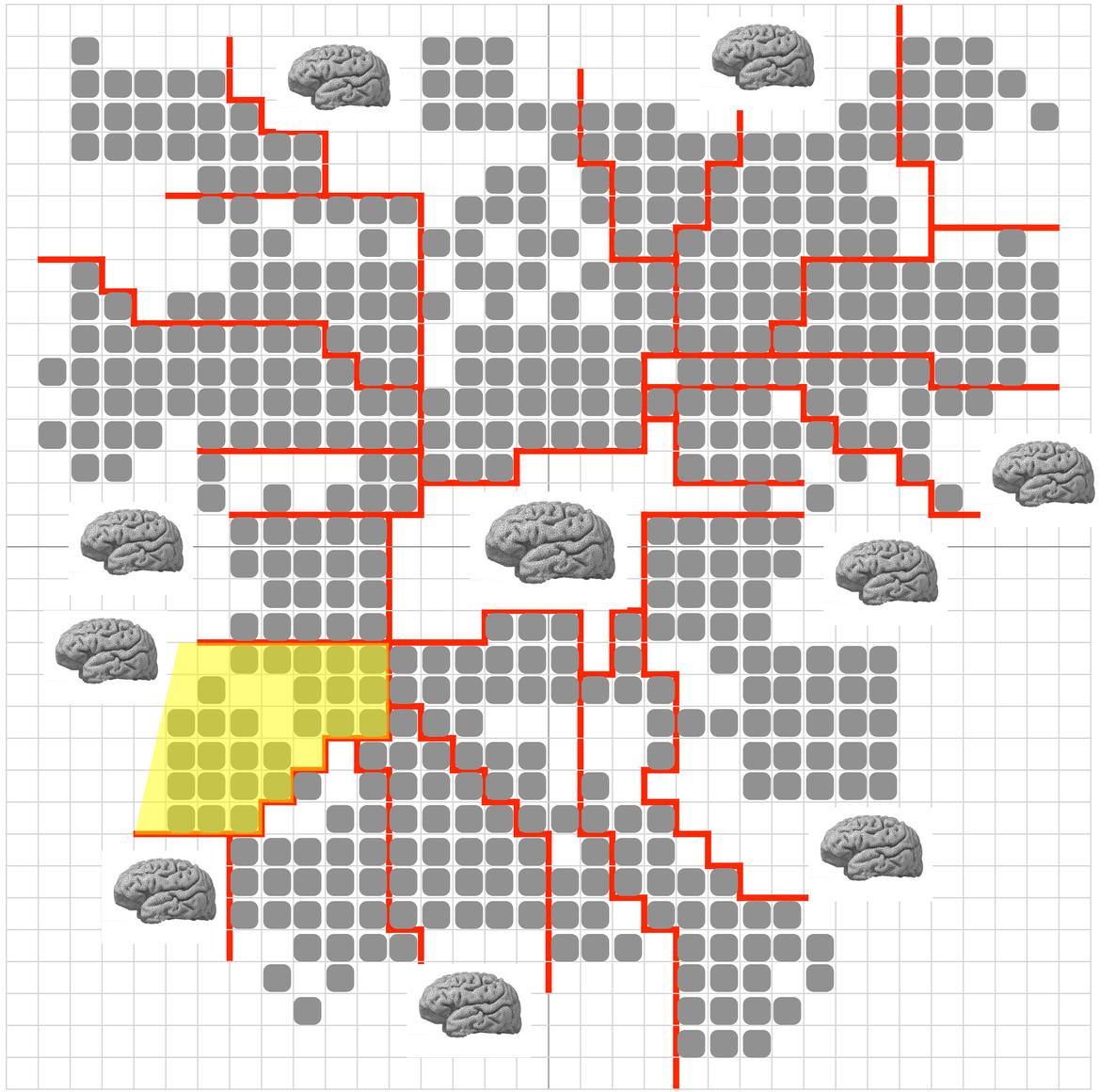


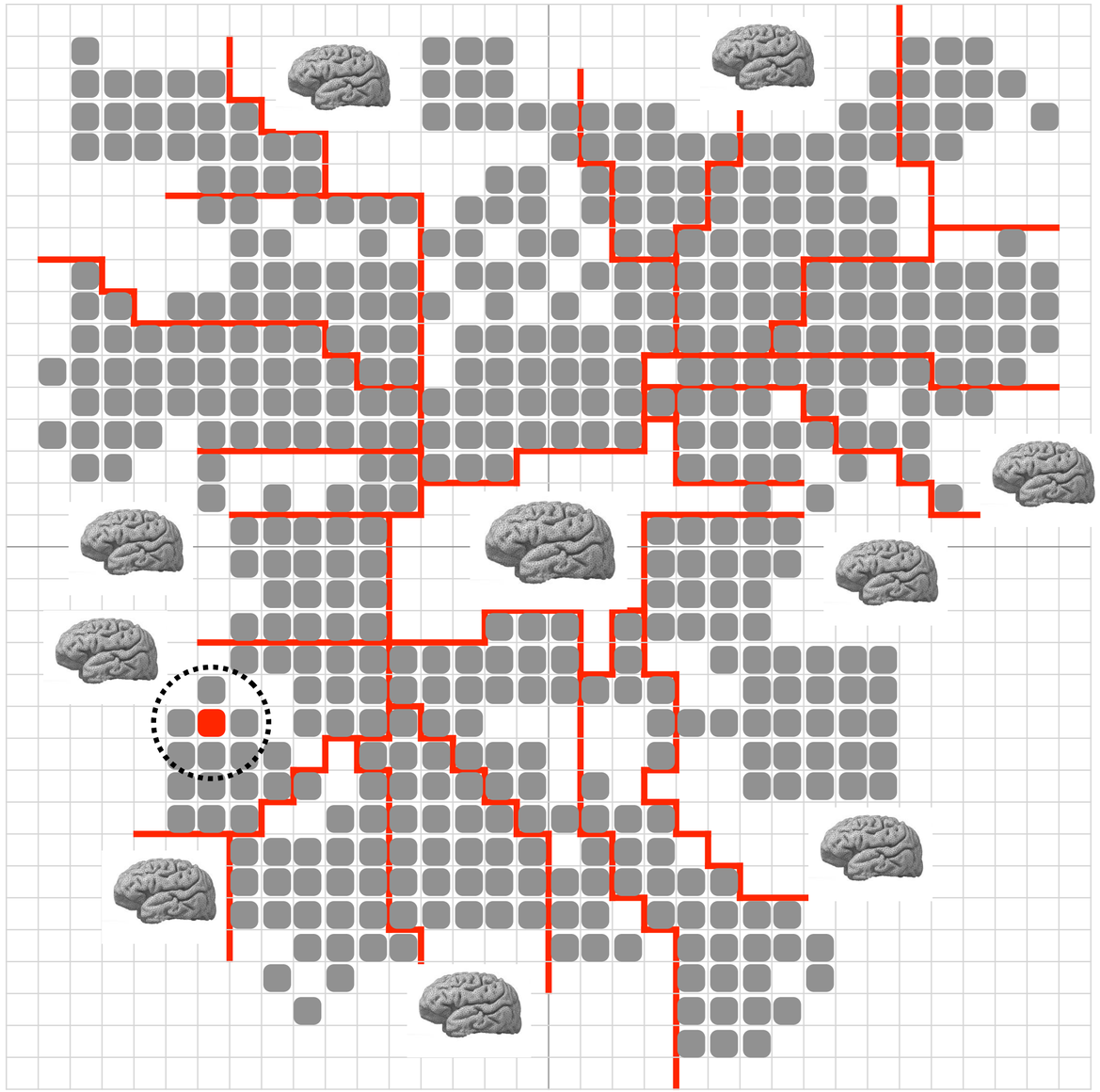
design and construction is decision making in a complex environment

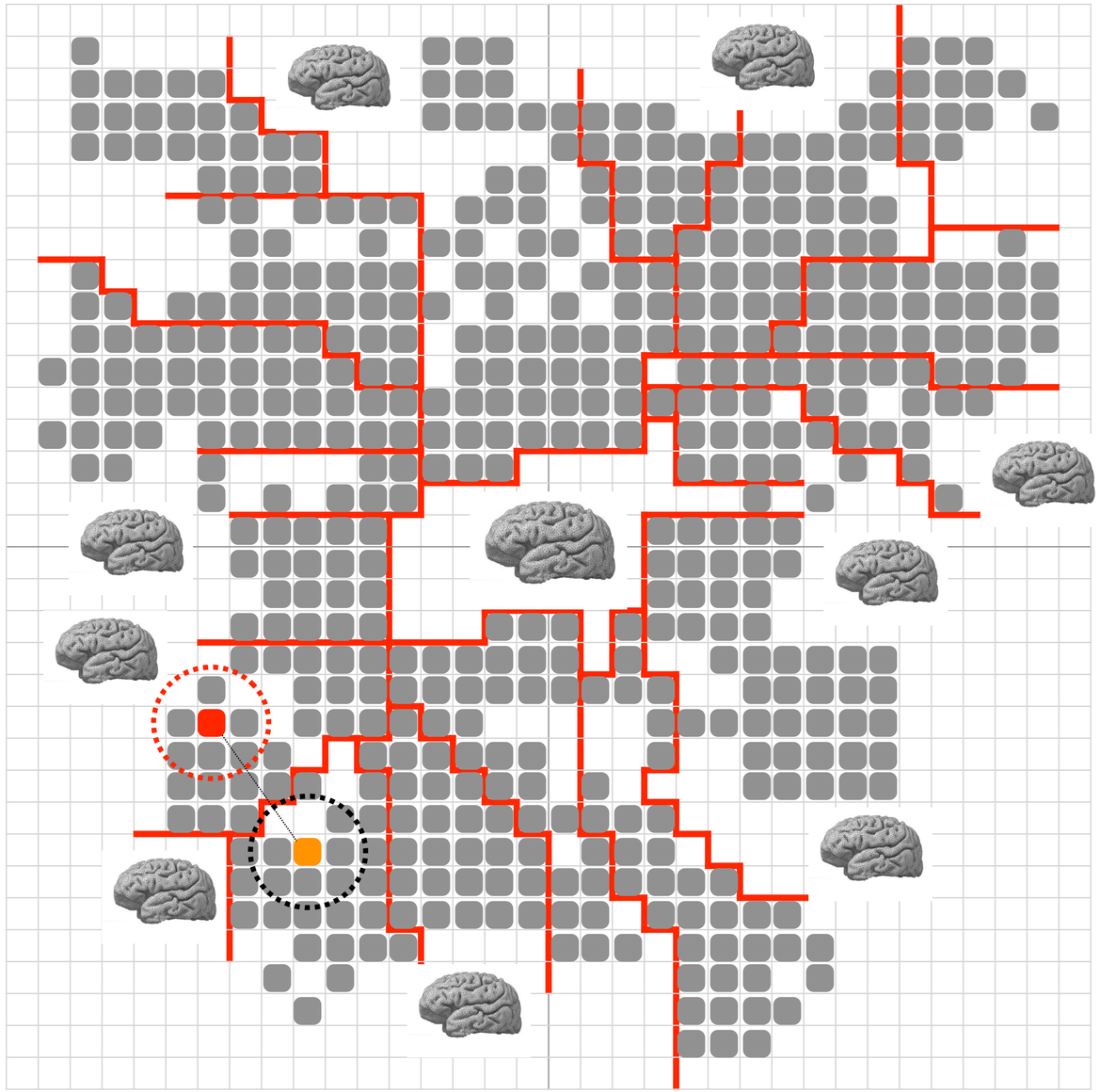
how do we navigate?

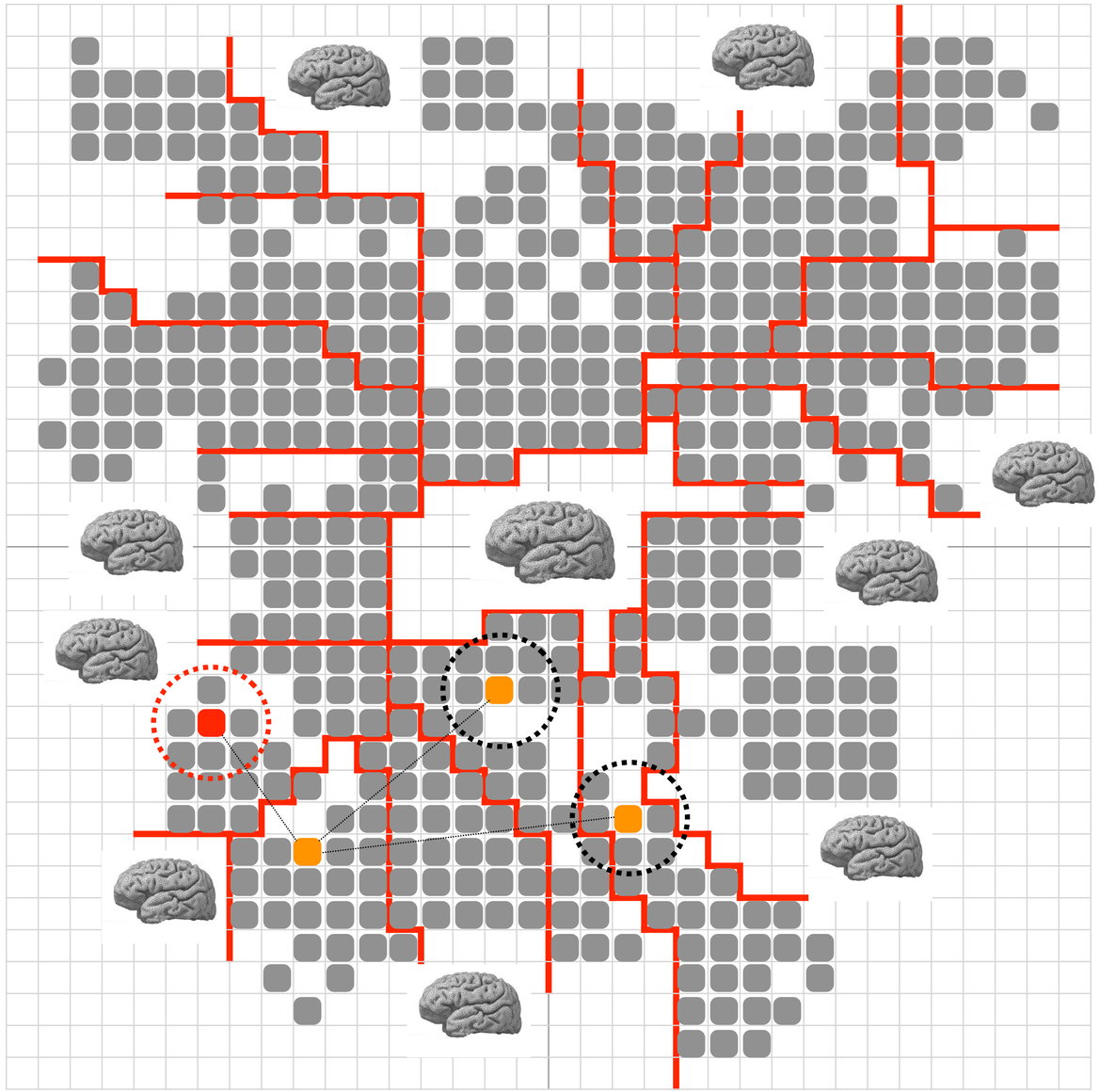


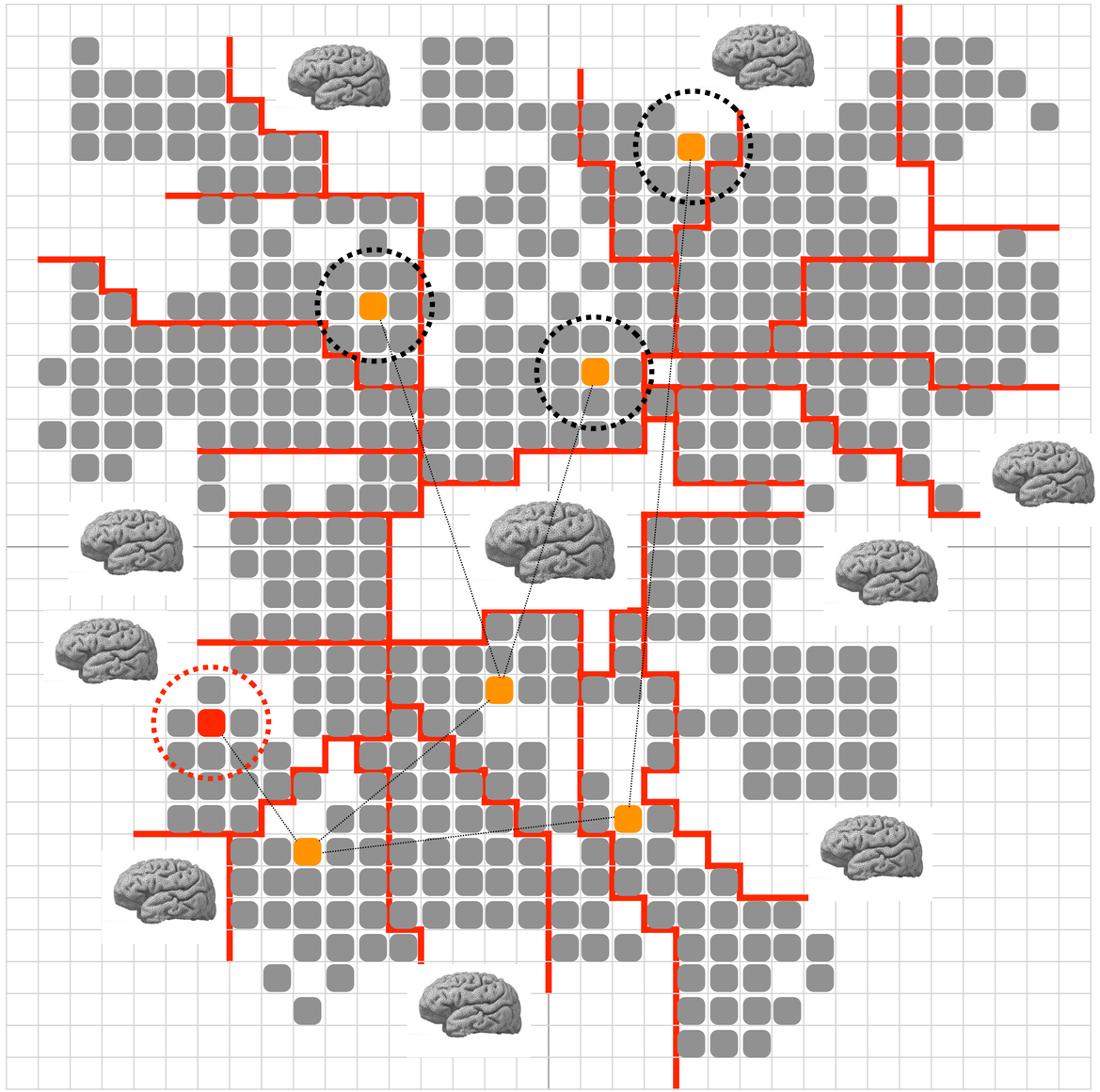


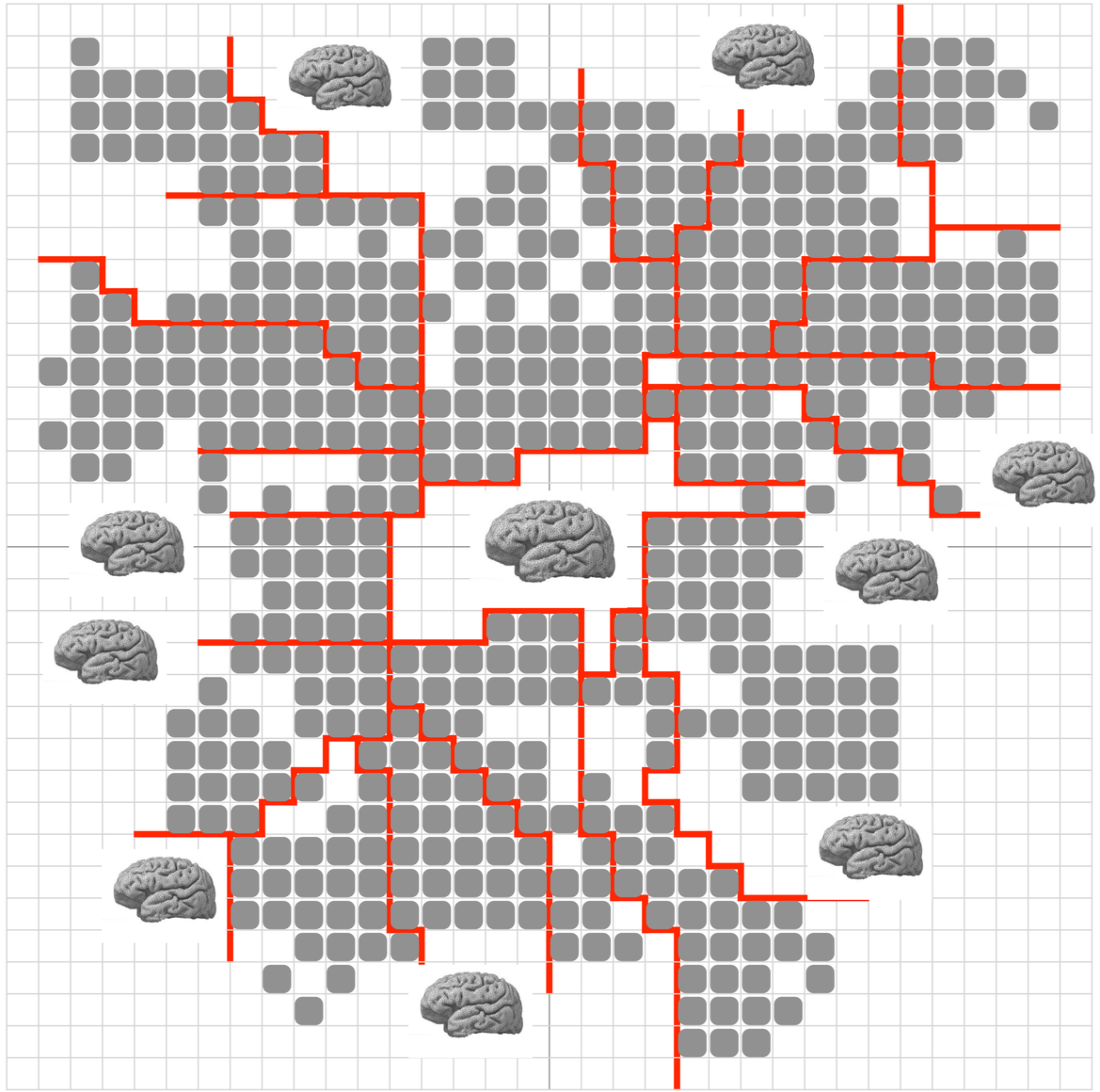


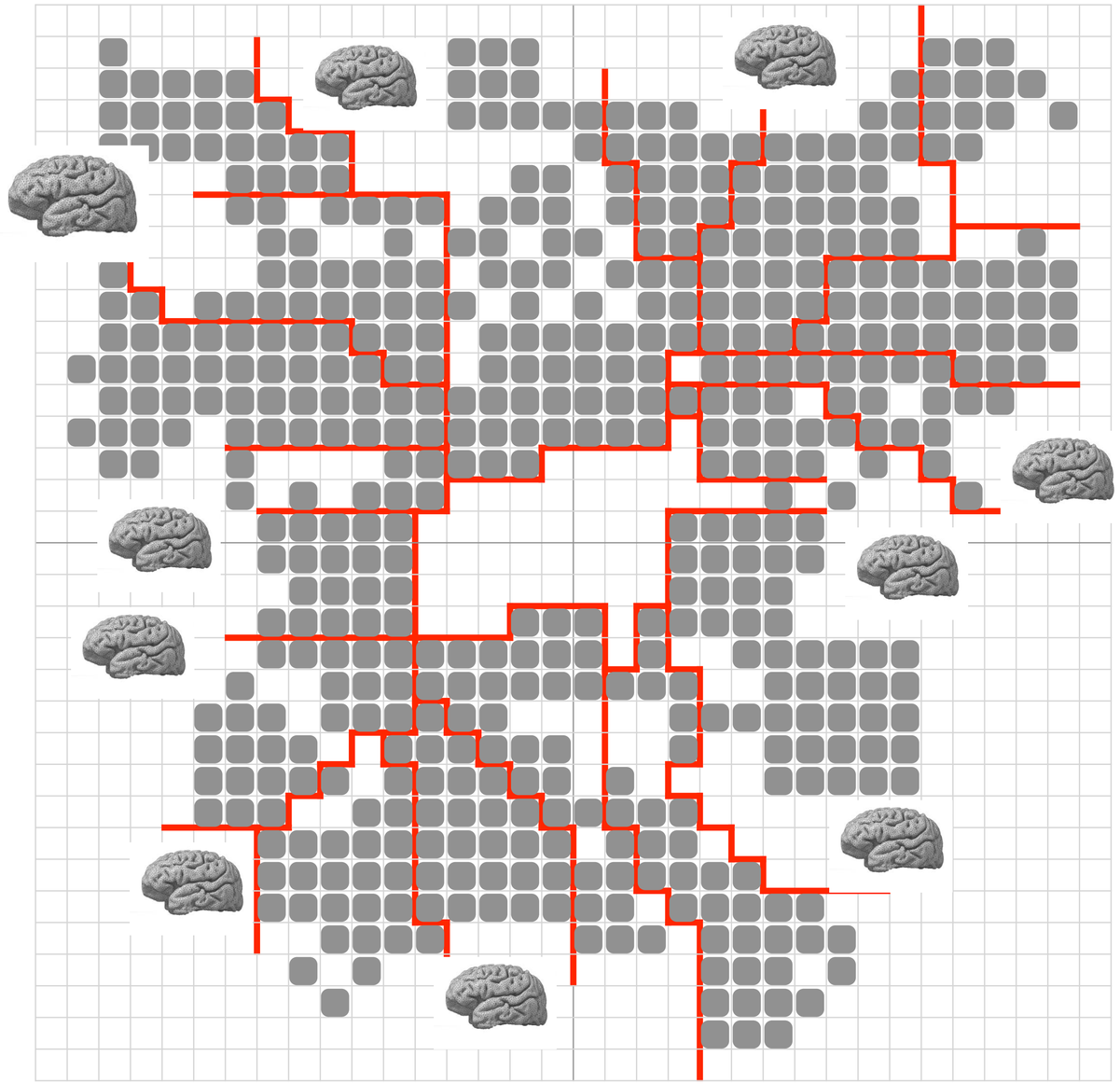


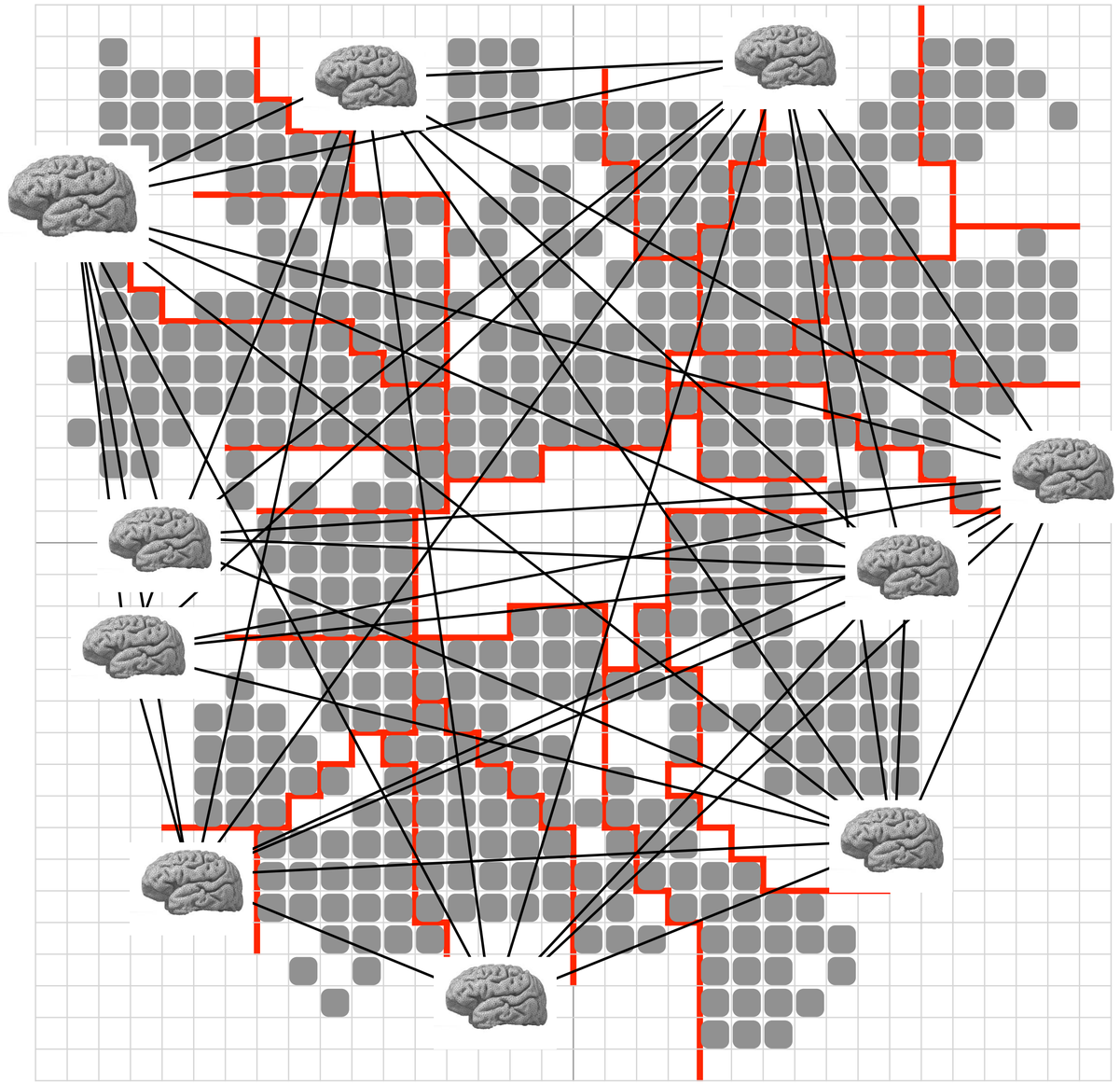


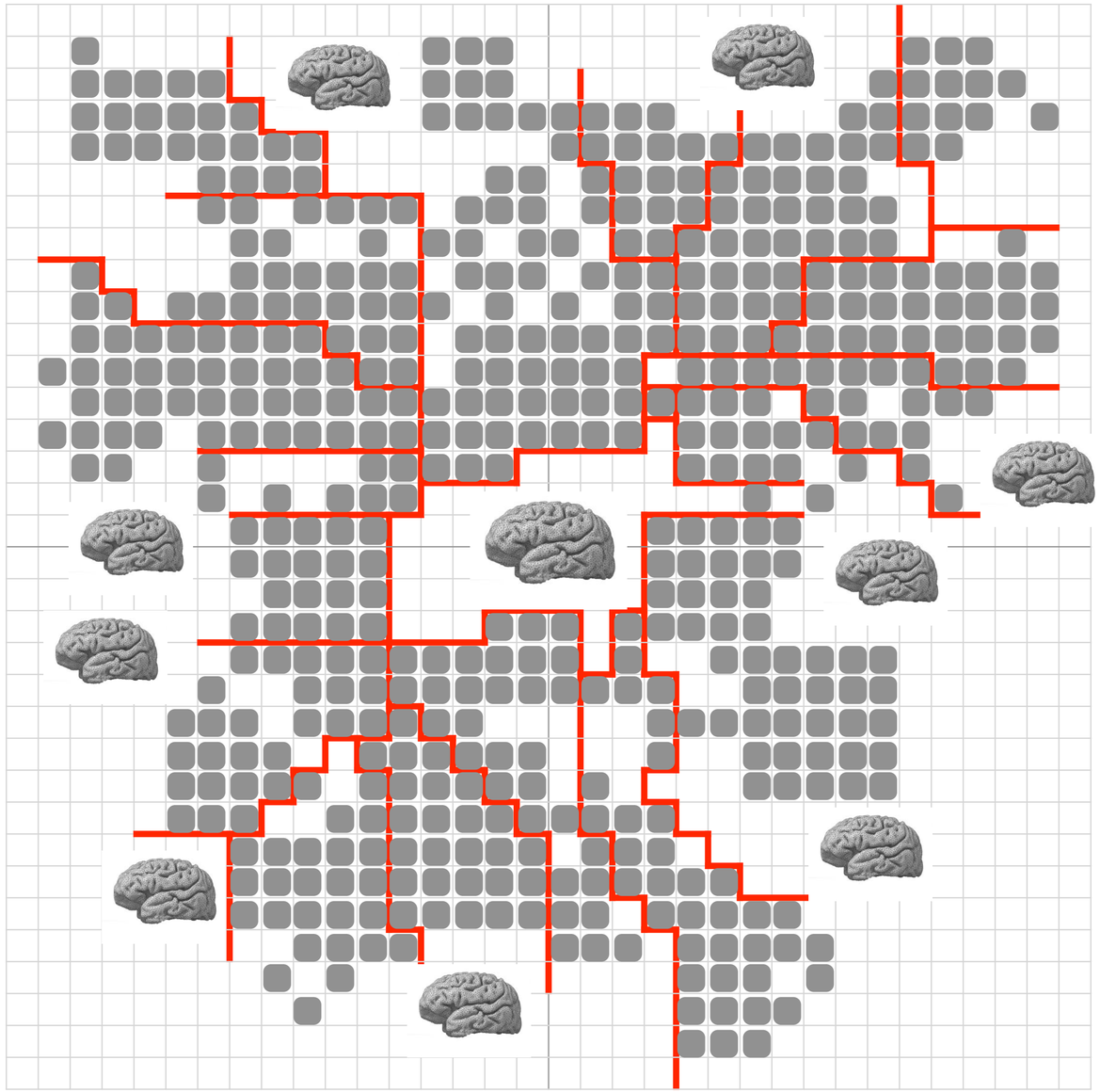


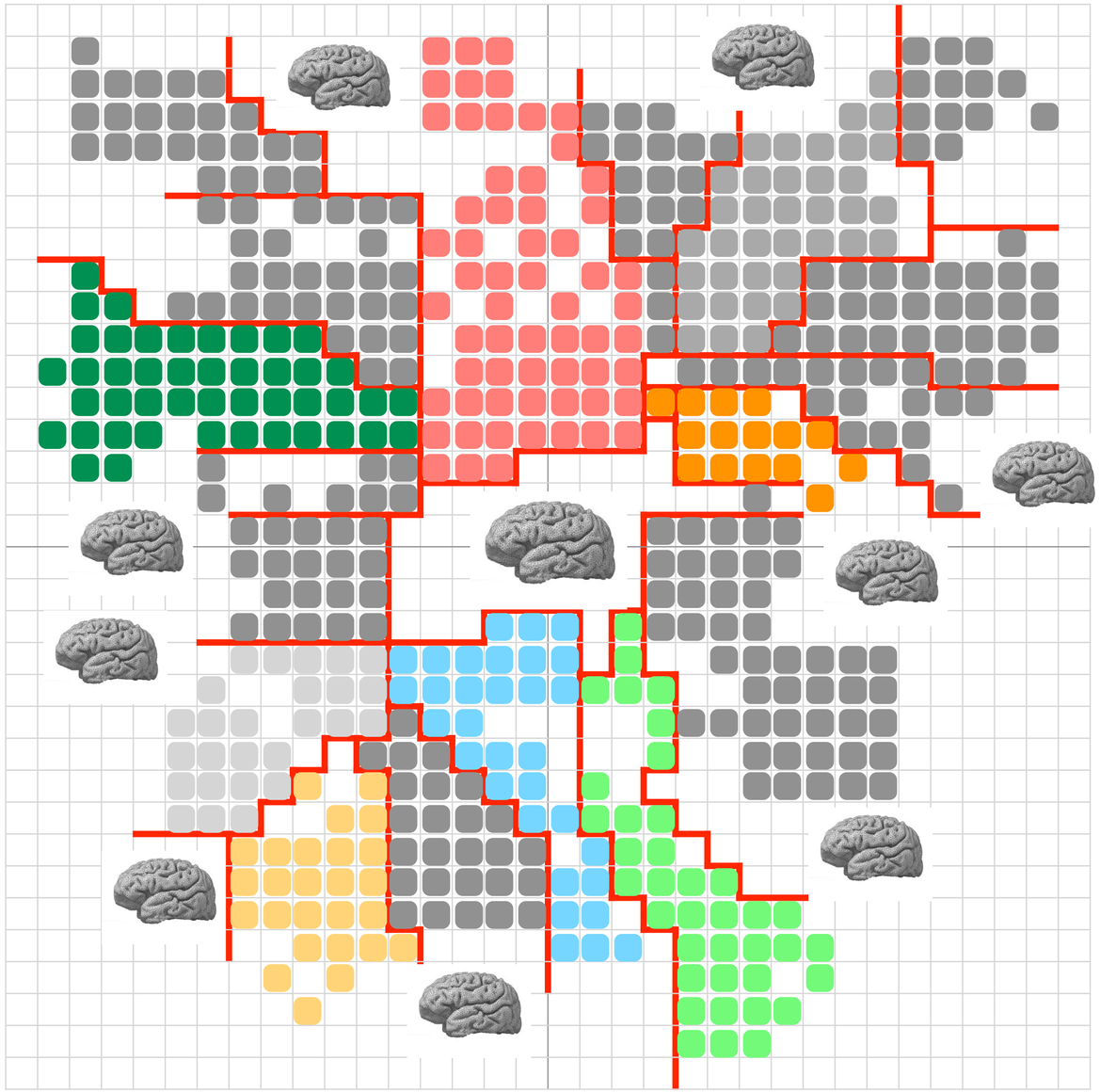


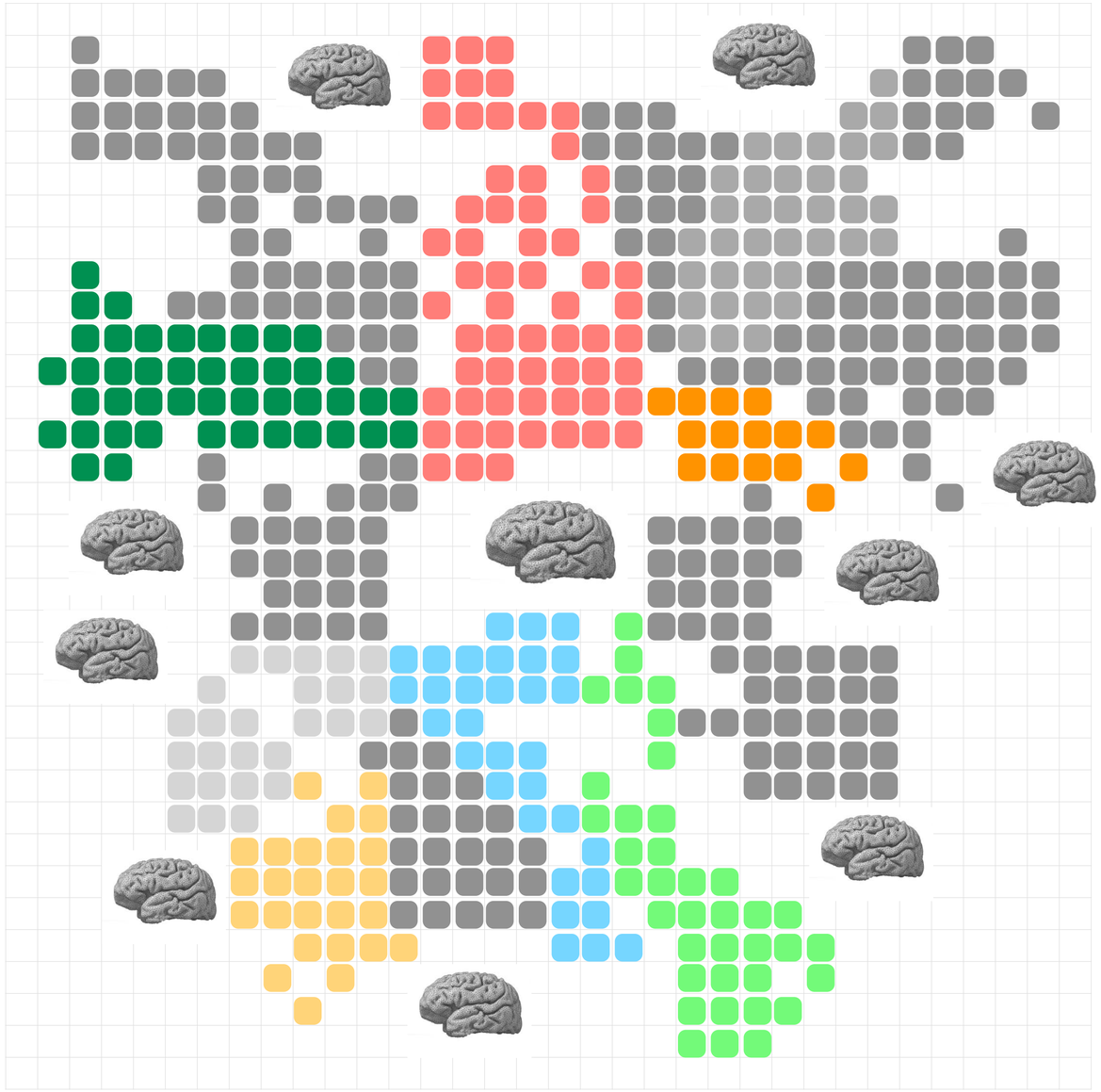


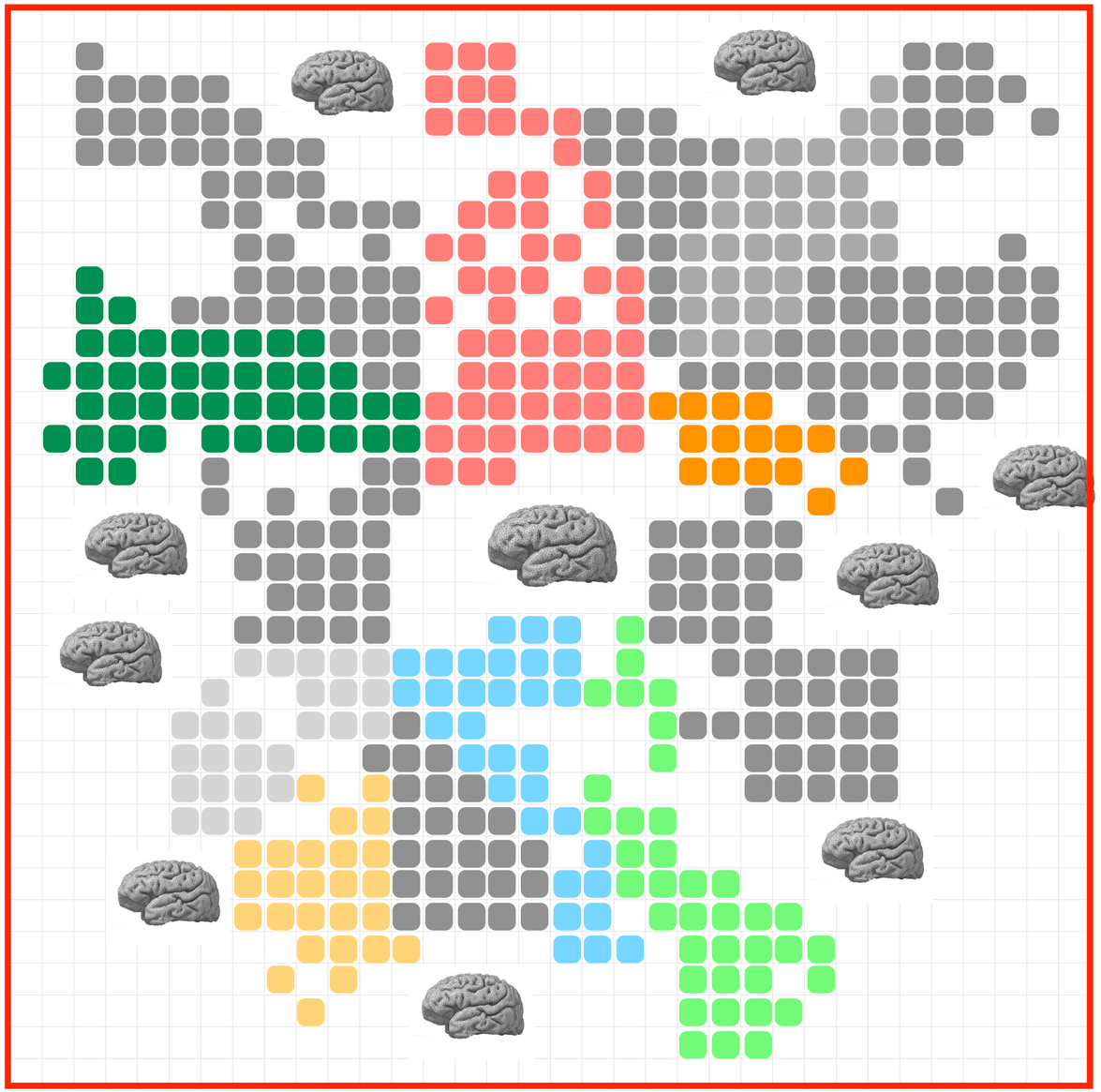


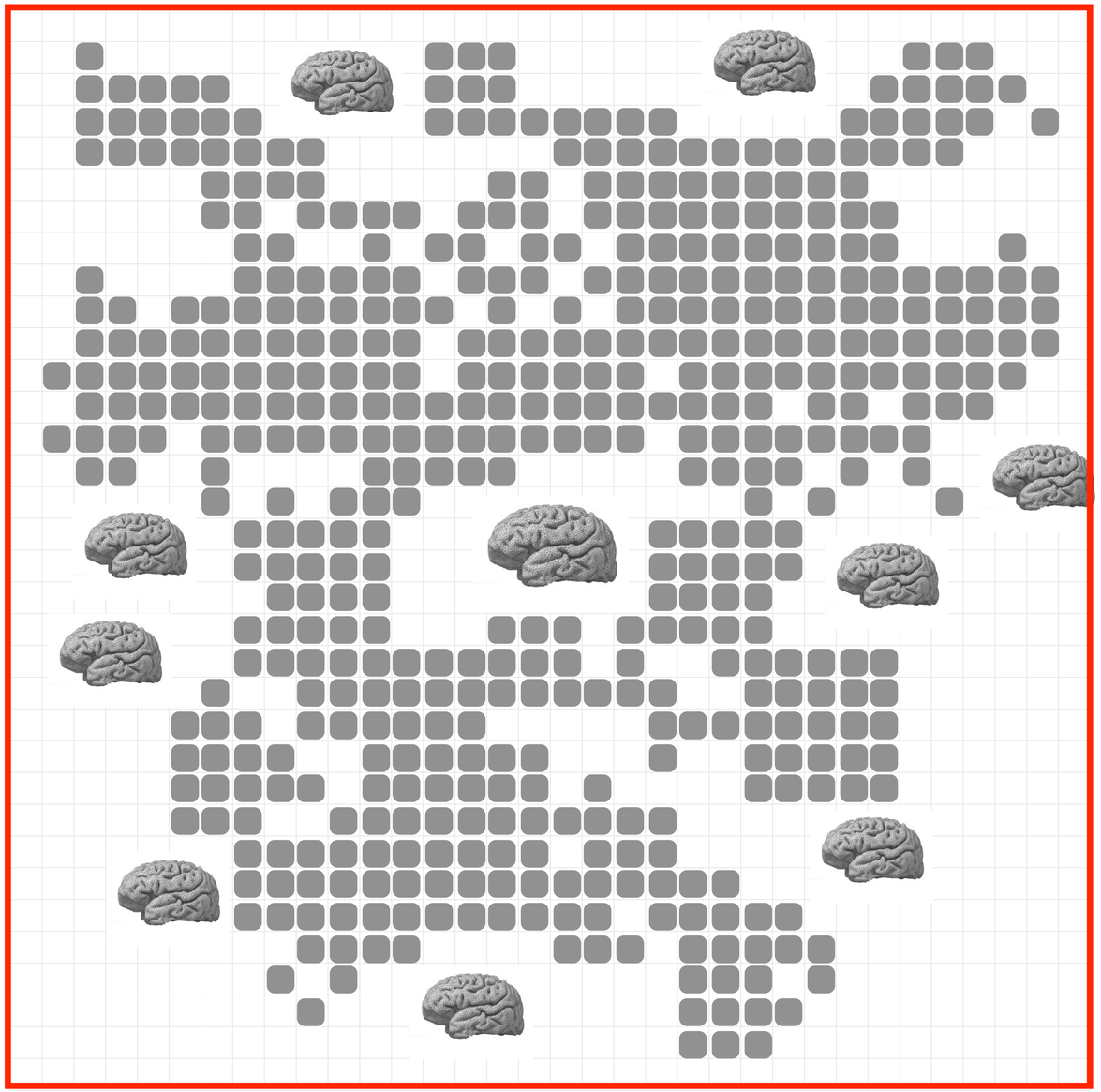












complexity

problems are connected

ripples cause unanticipated outcomes

what we think is the problem is perhaps not the problem

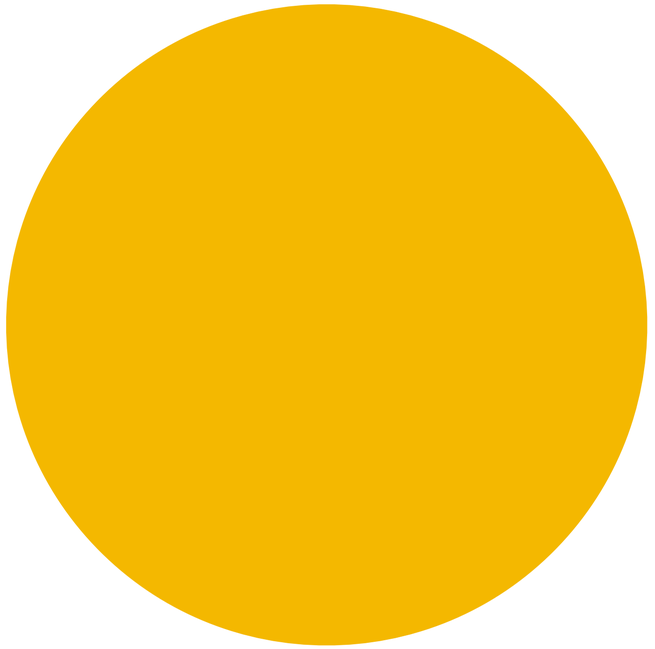
ripples from decisions cross contractual boundaries

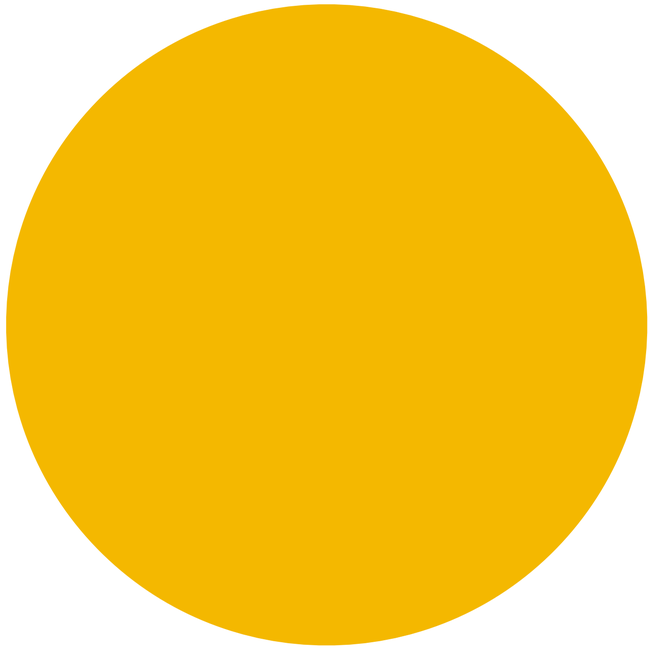
leaks occur at the intersection of contracts

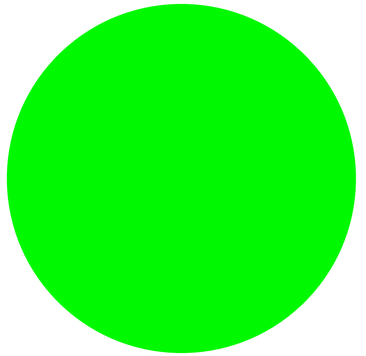
collaboration

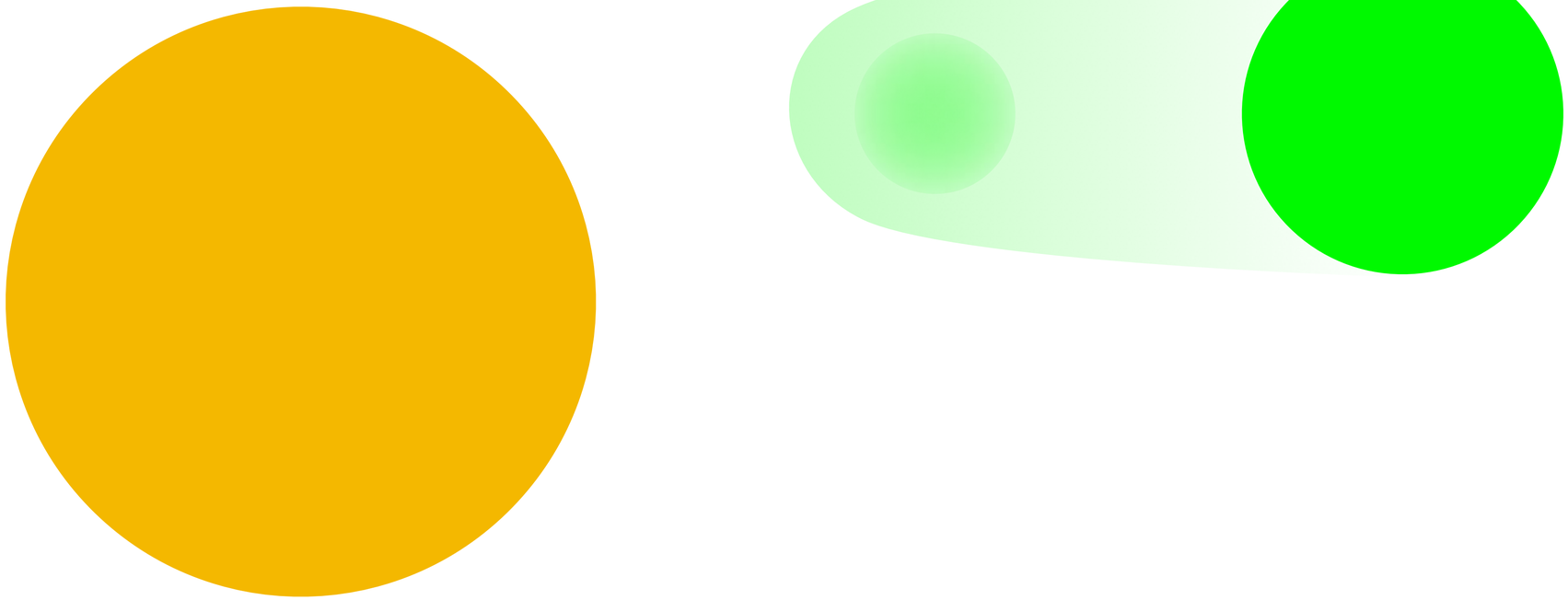
•

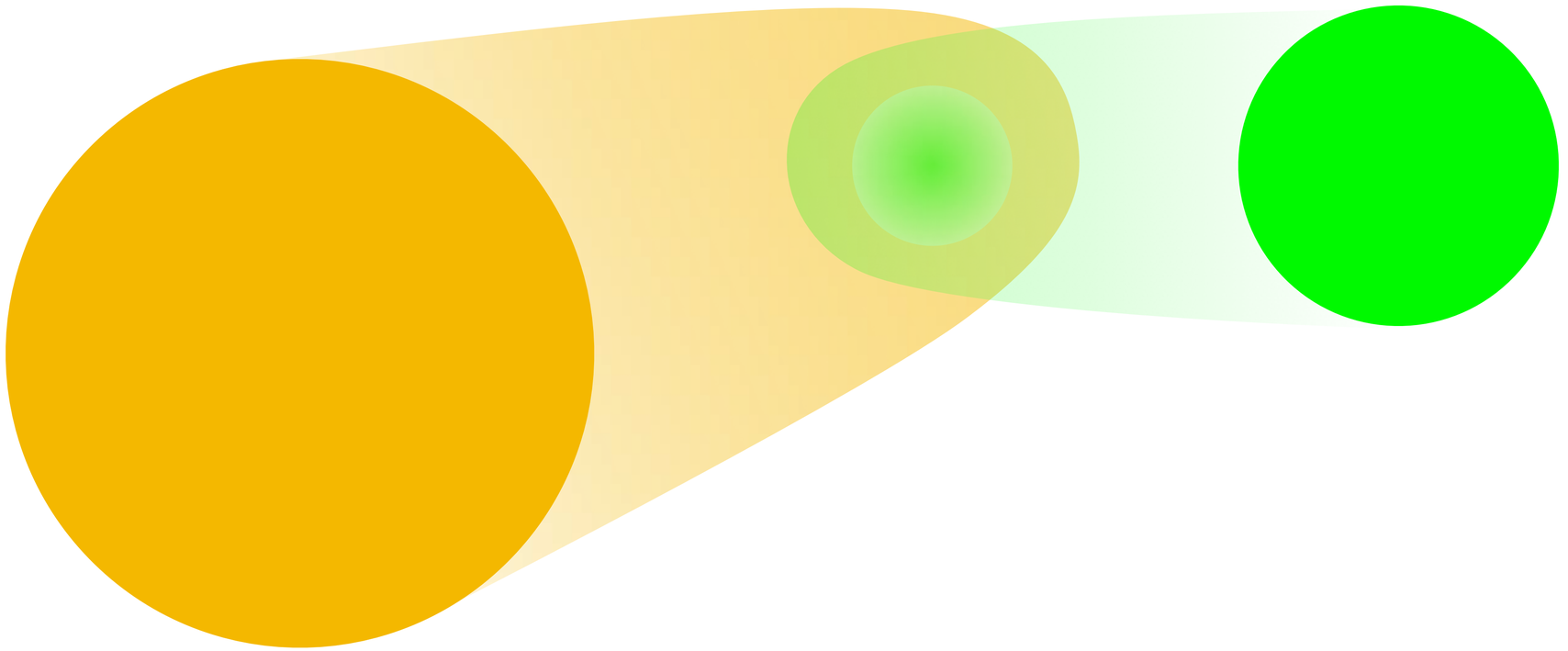
projects are networks

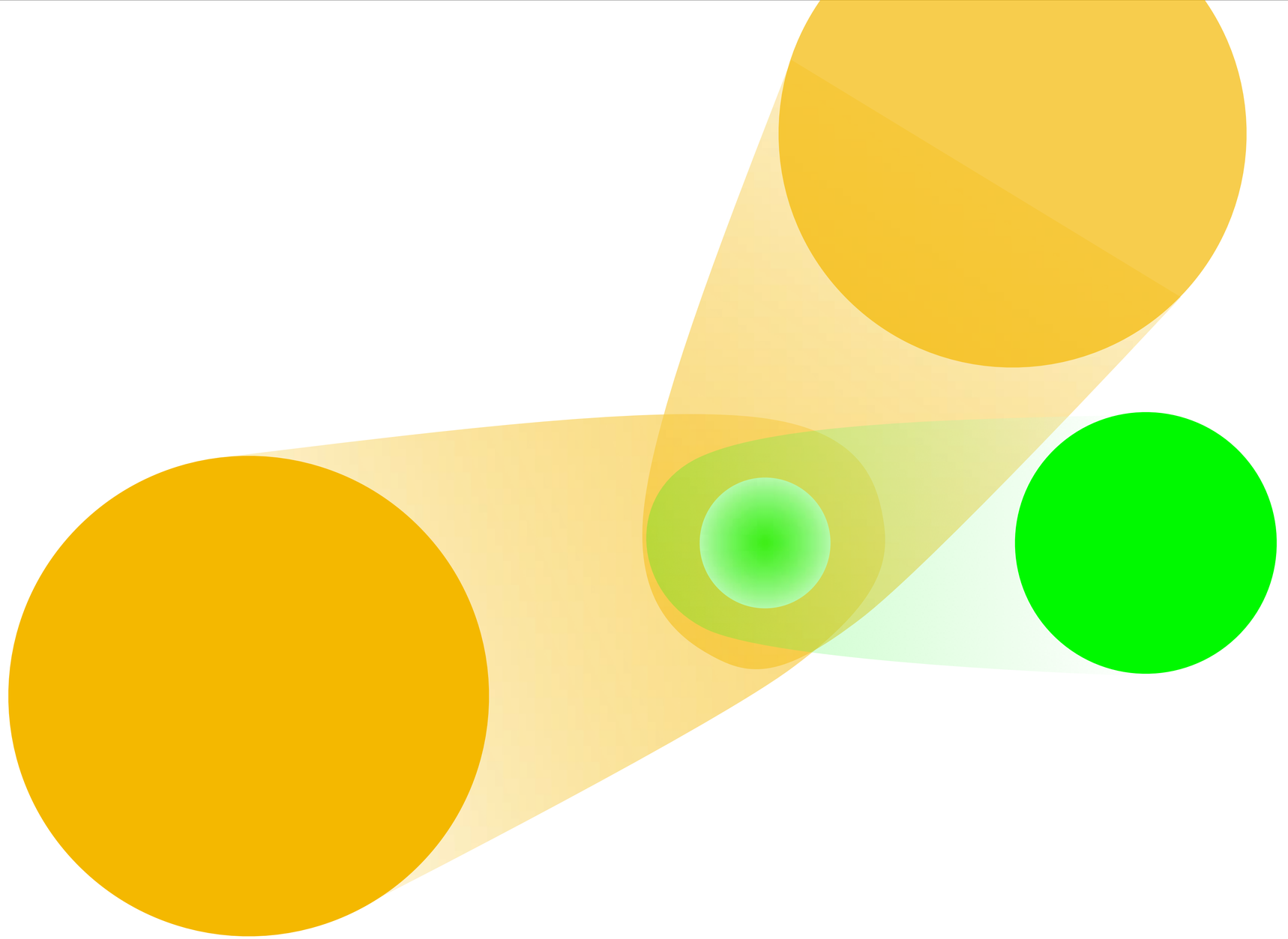


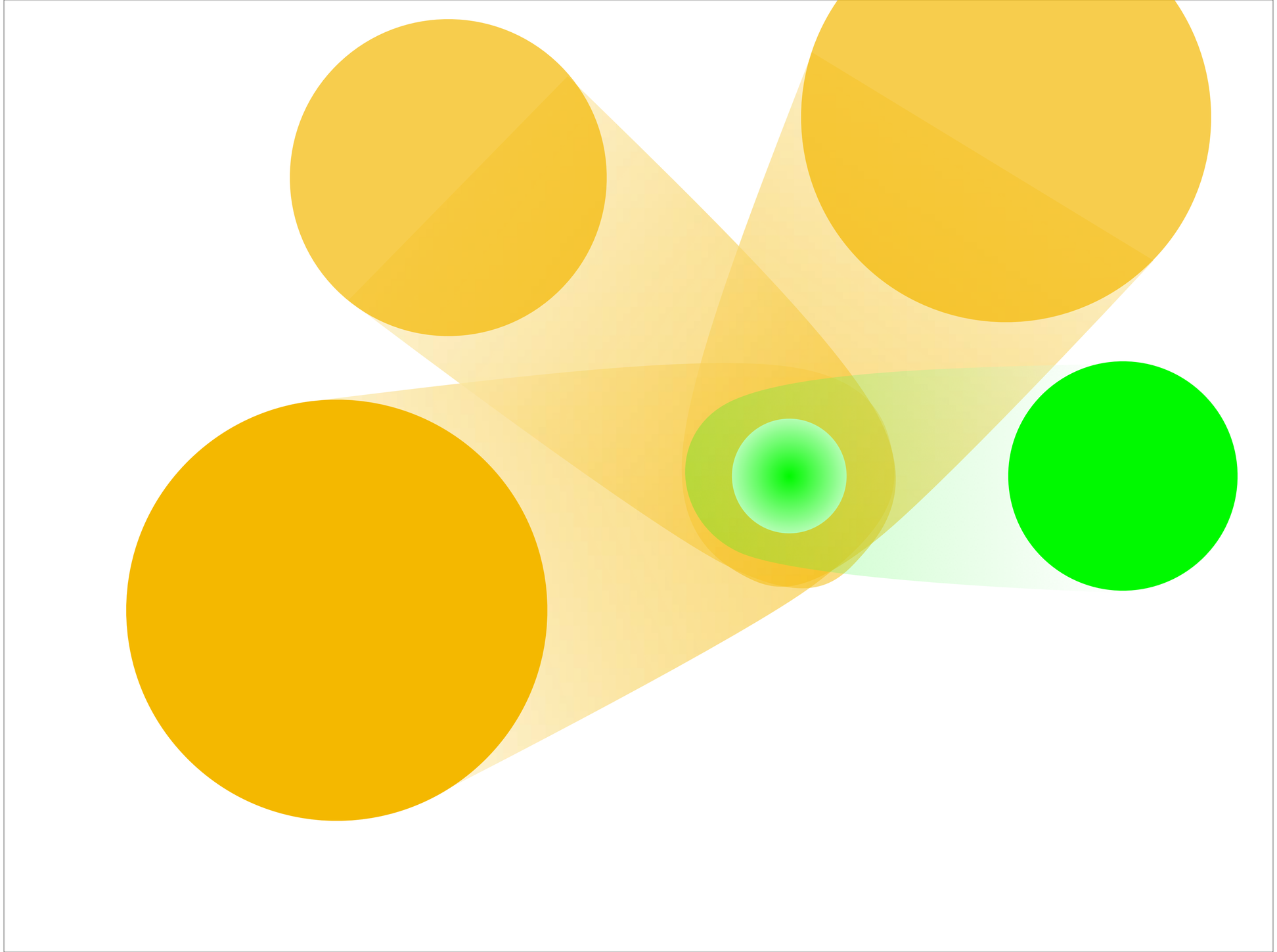


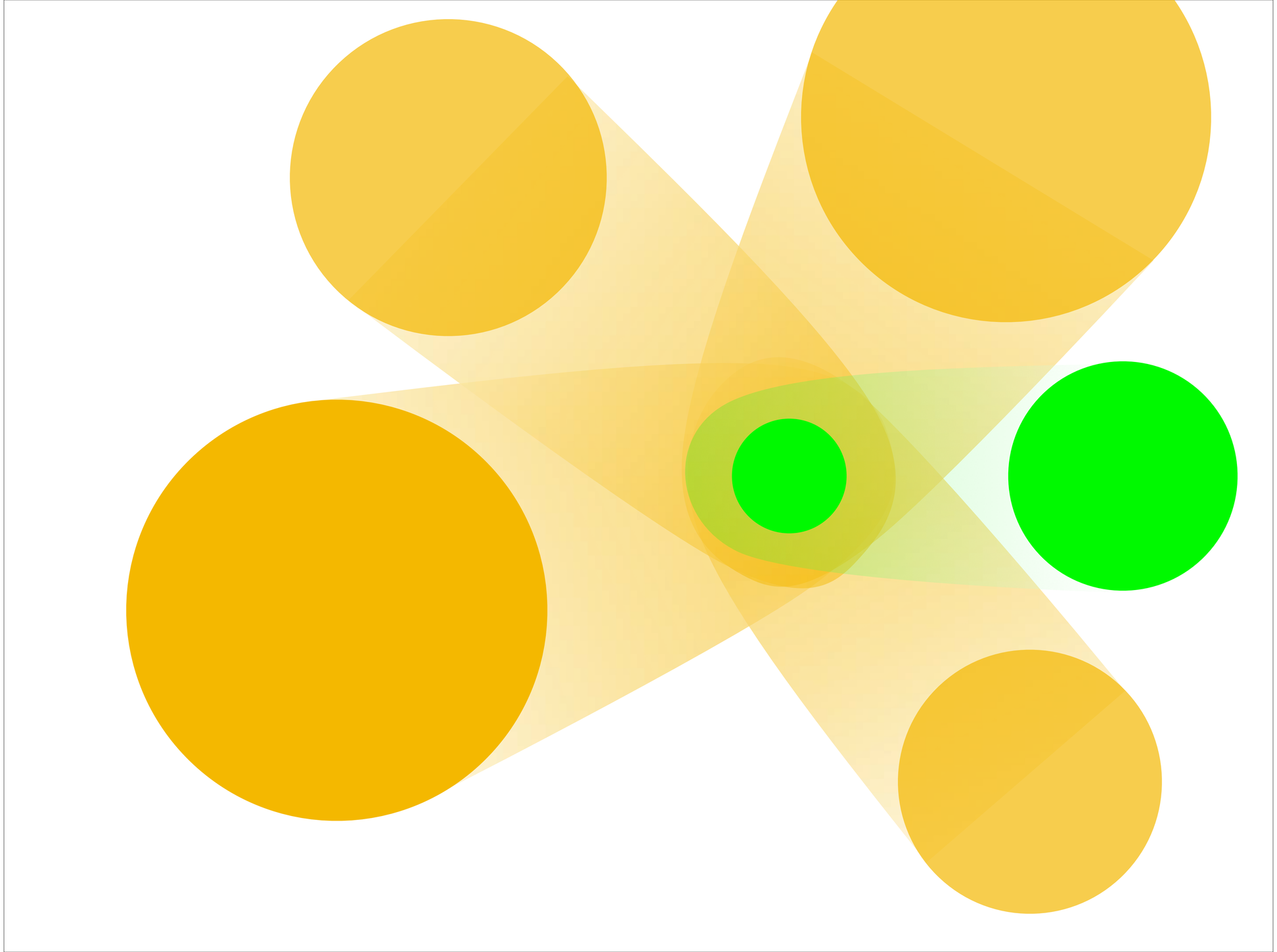


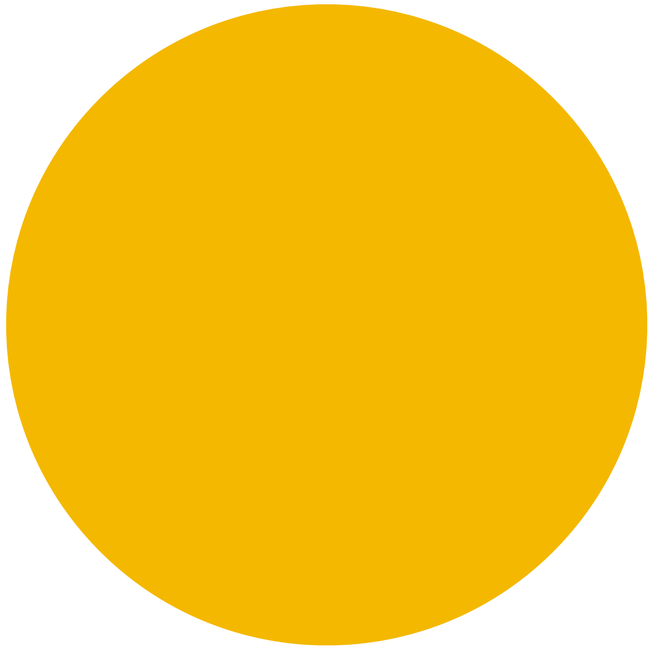


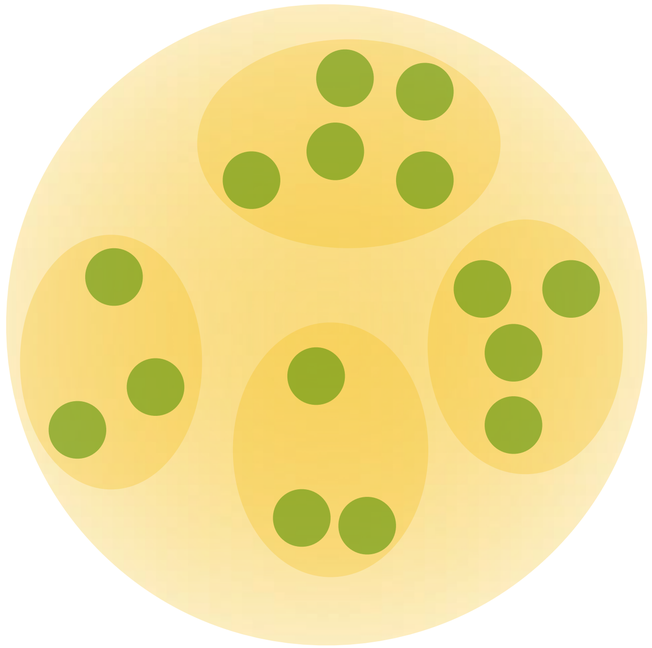


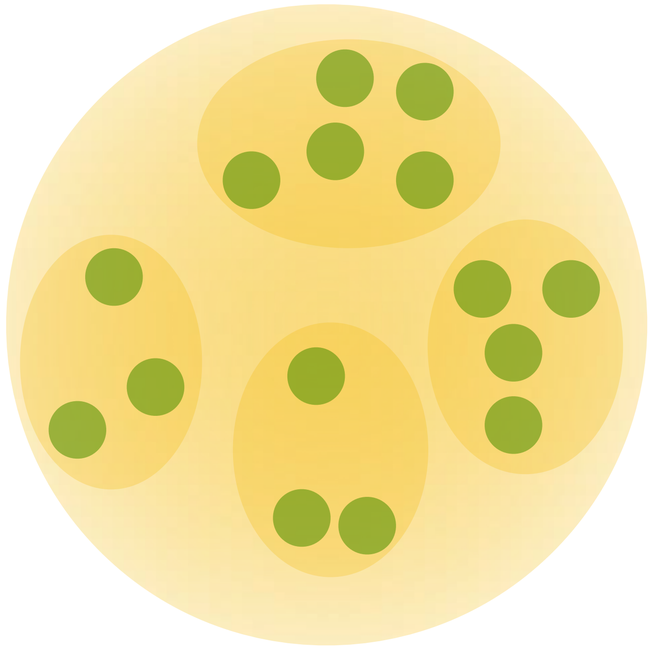


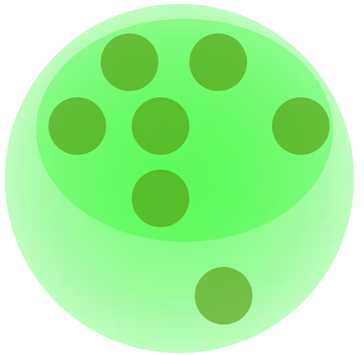


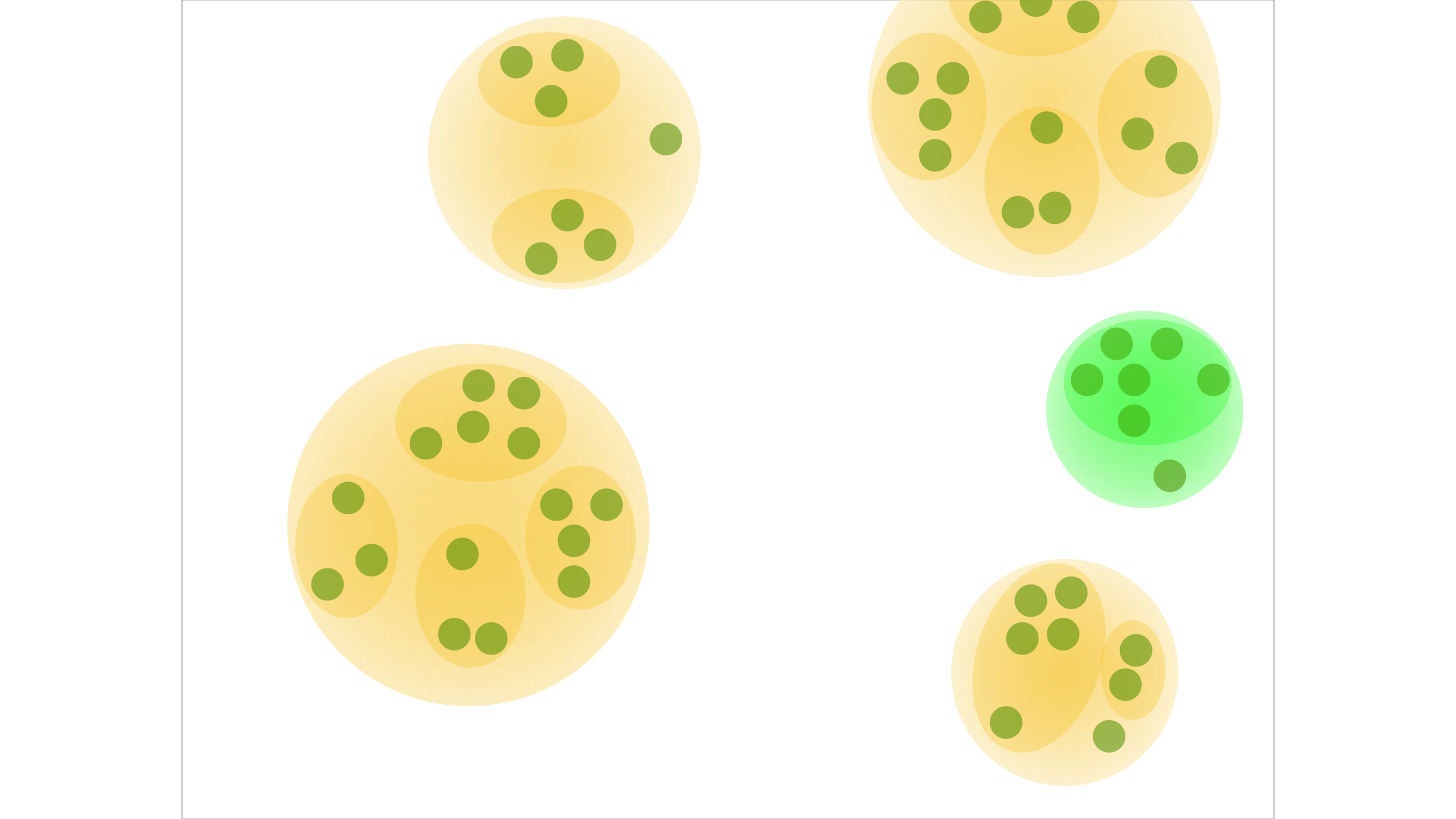


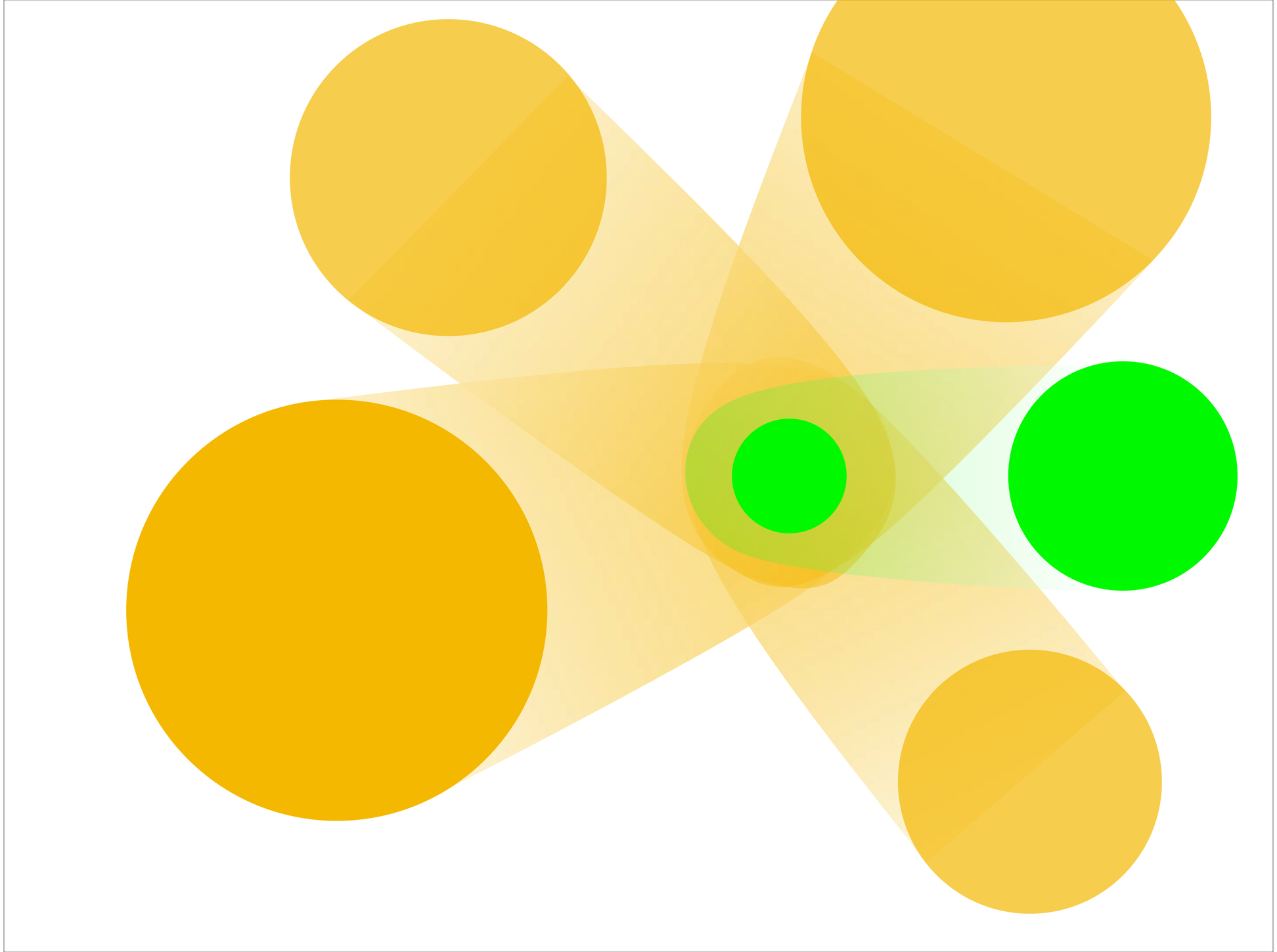


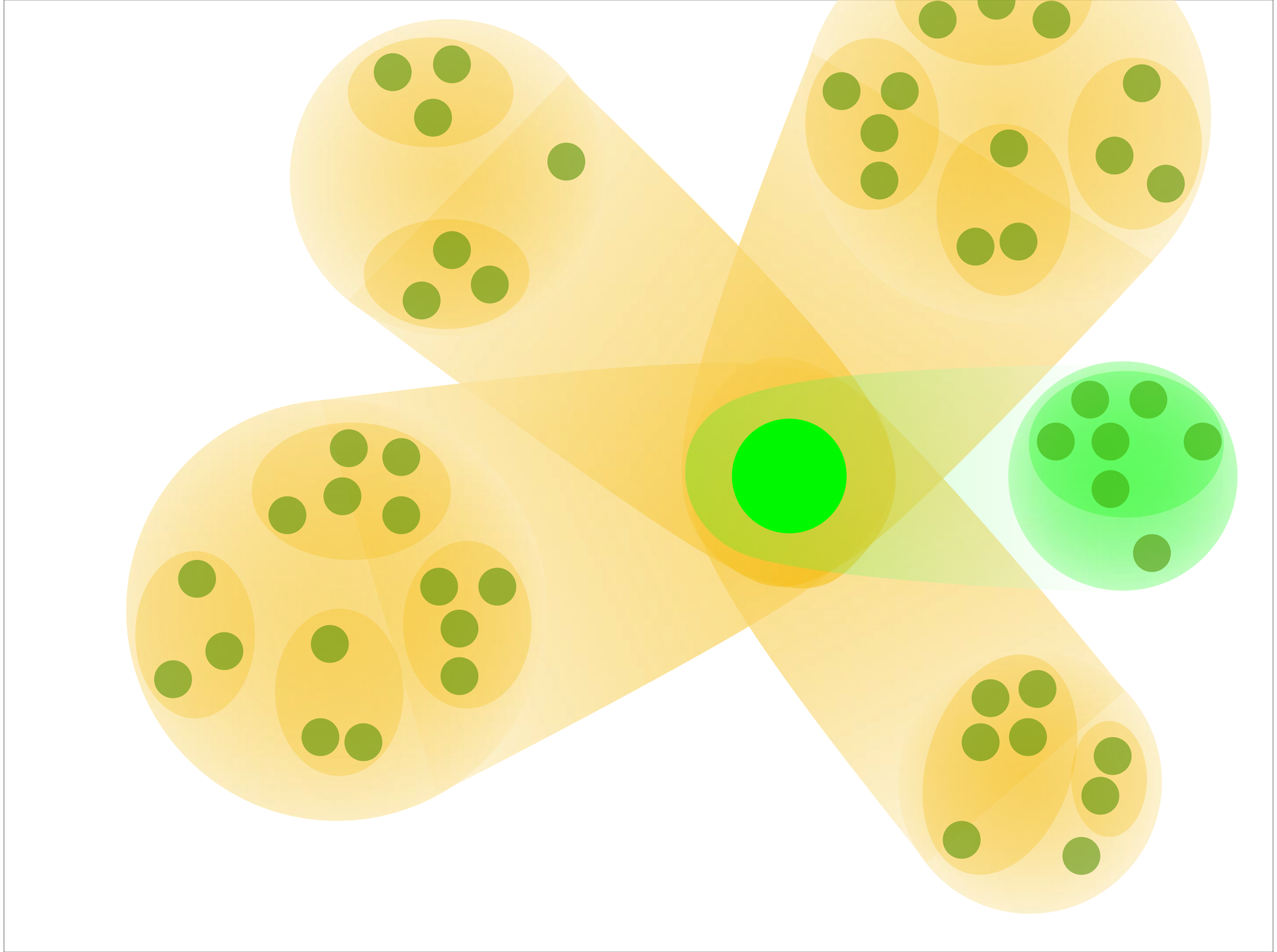


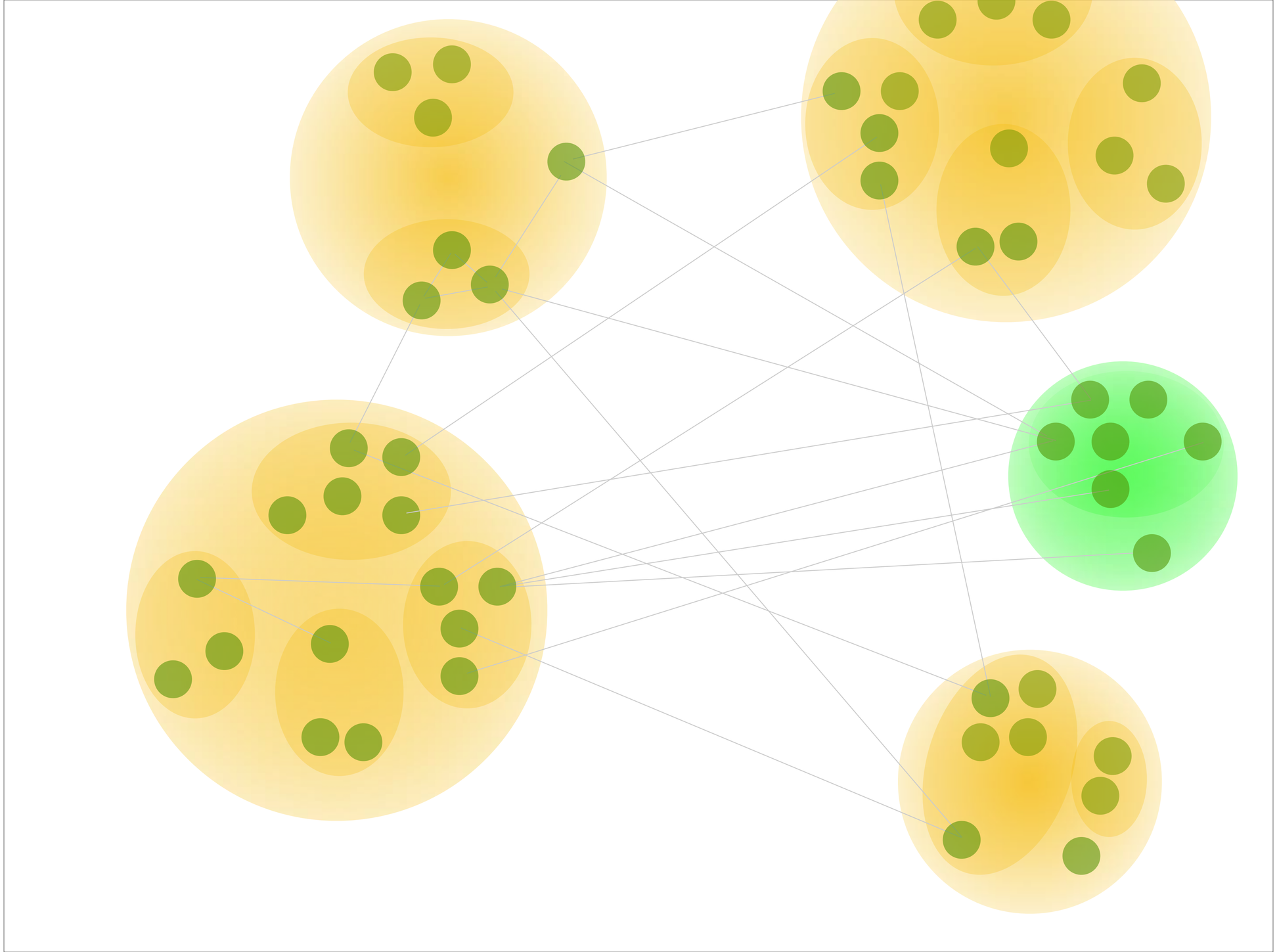


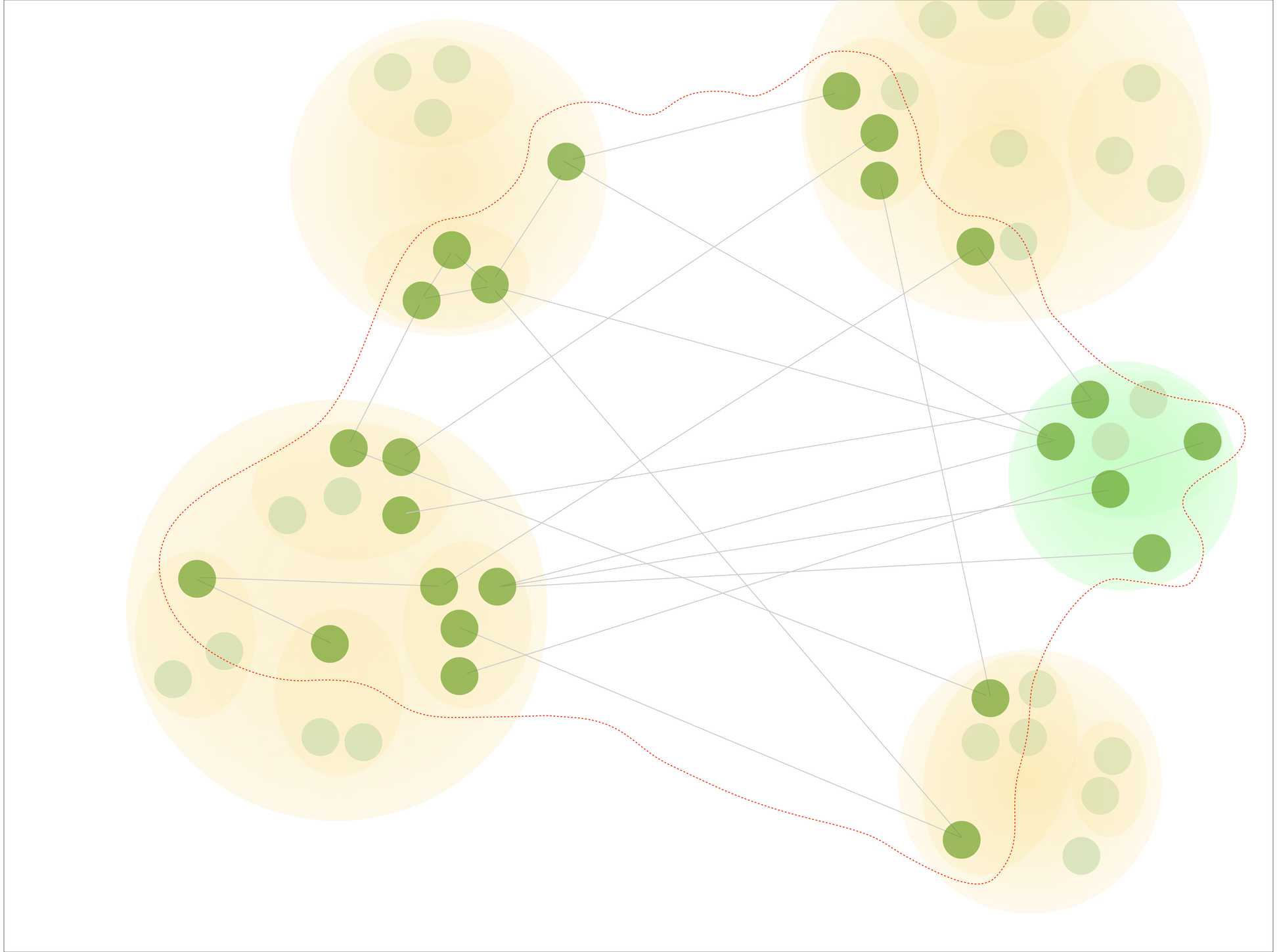


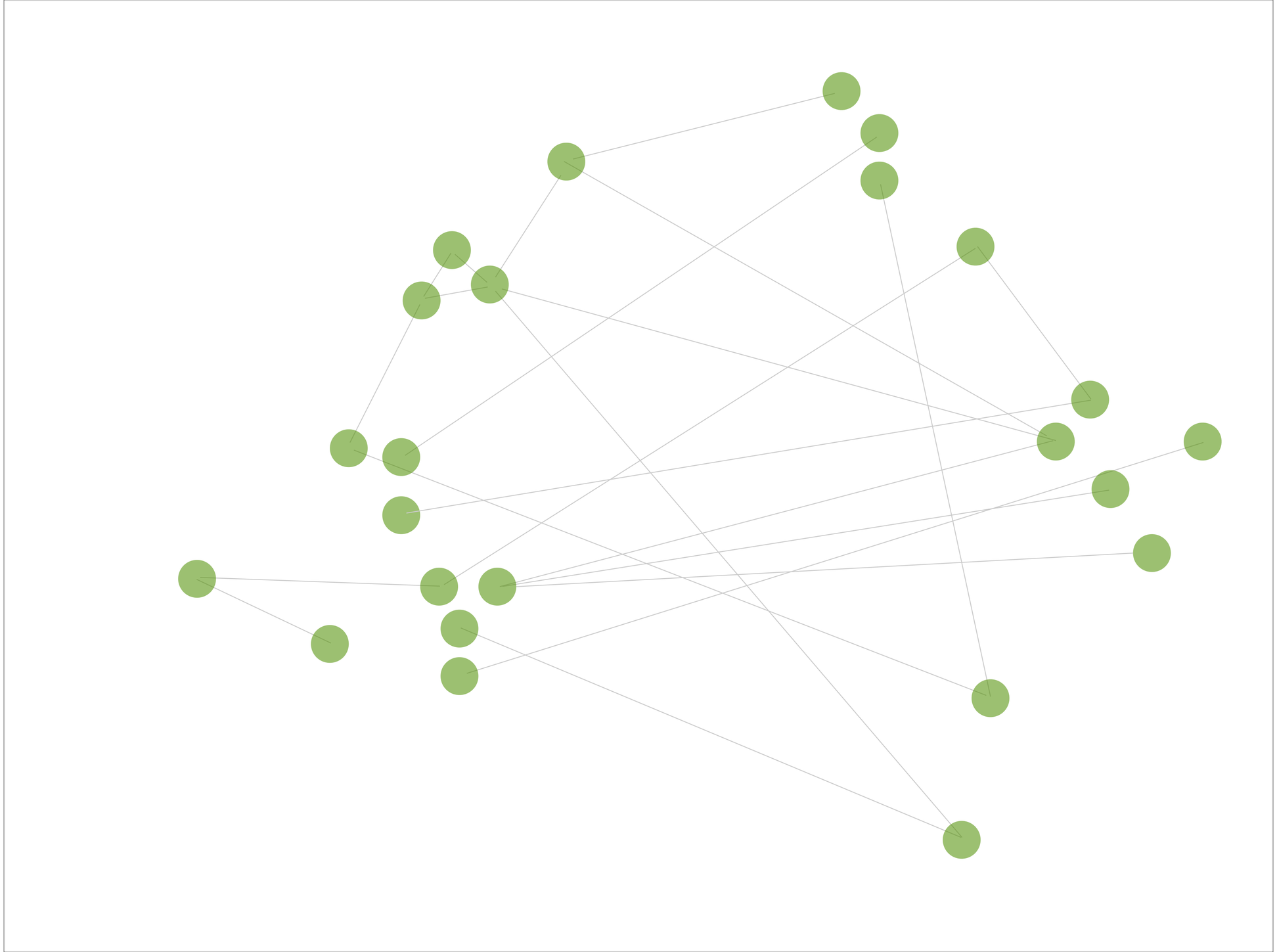


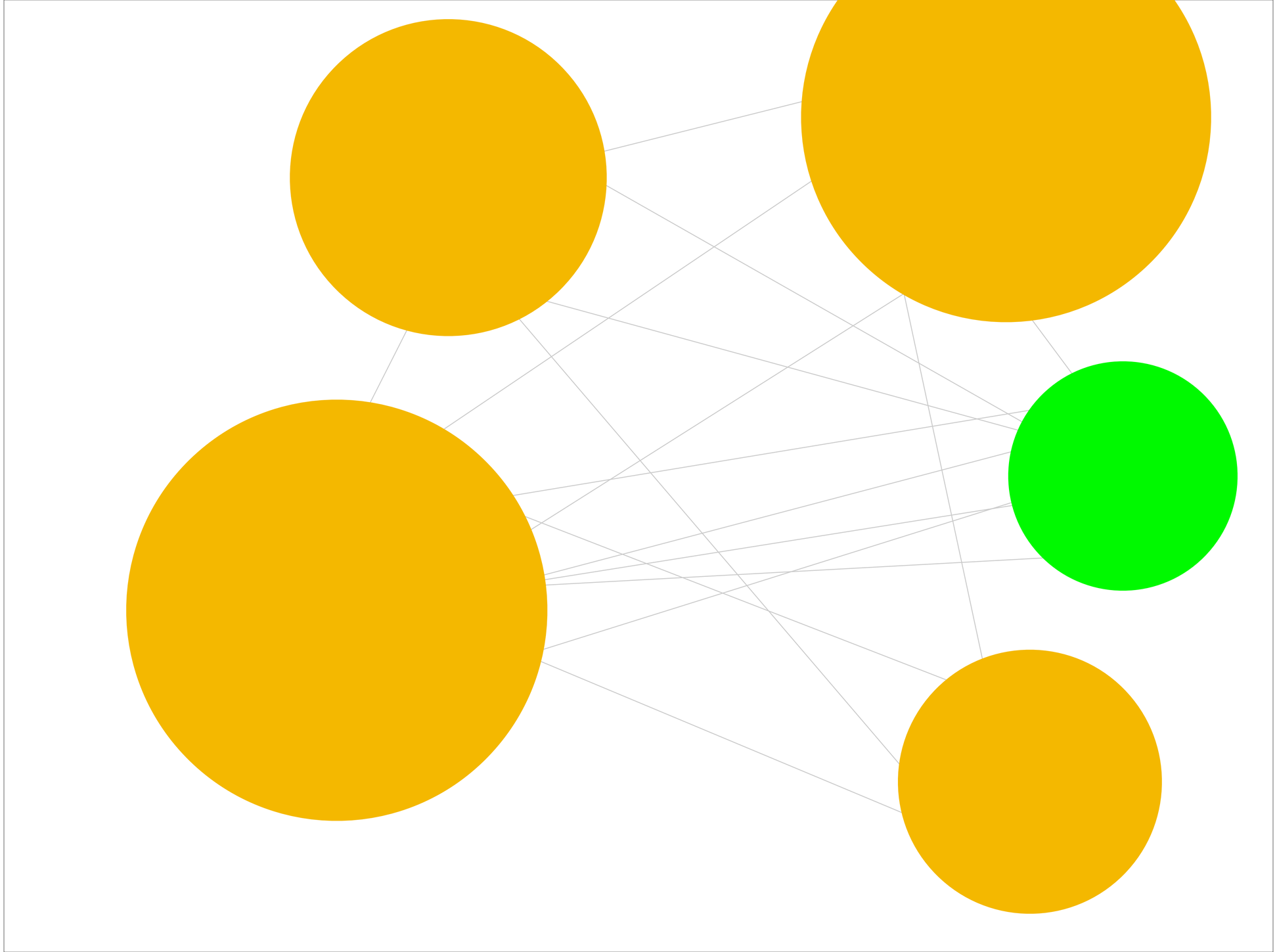


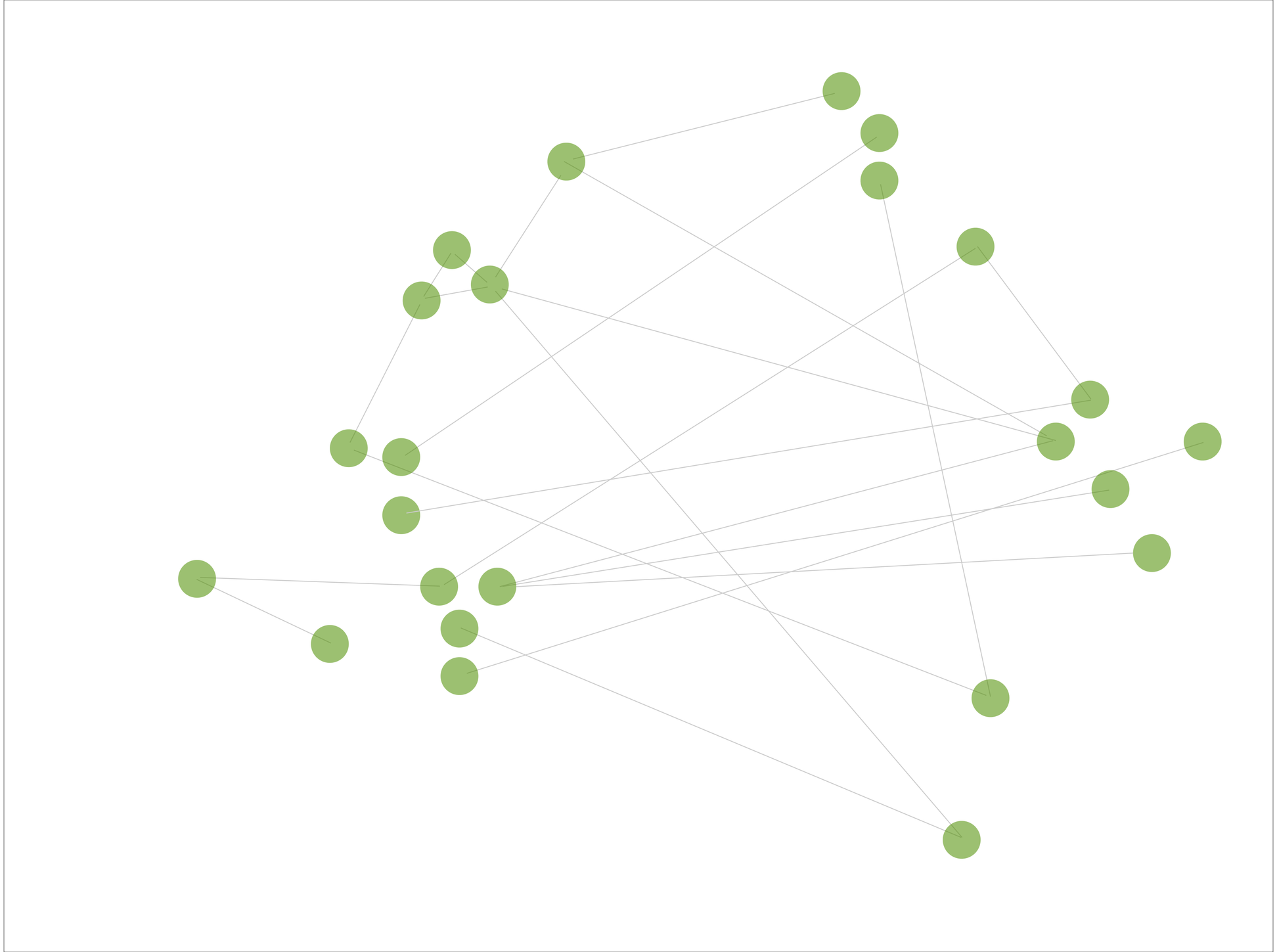


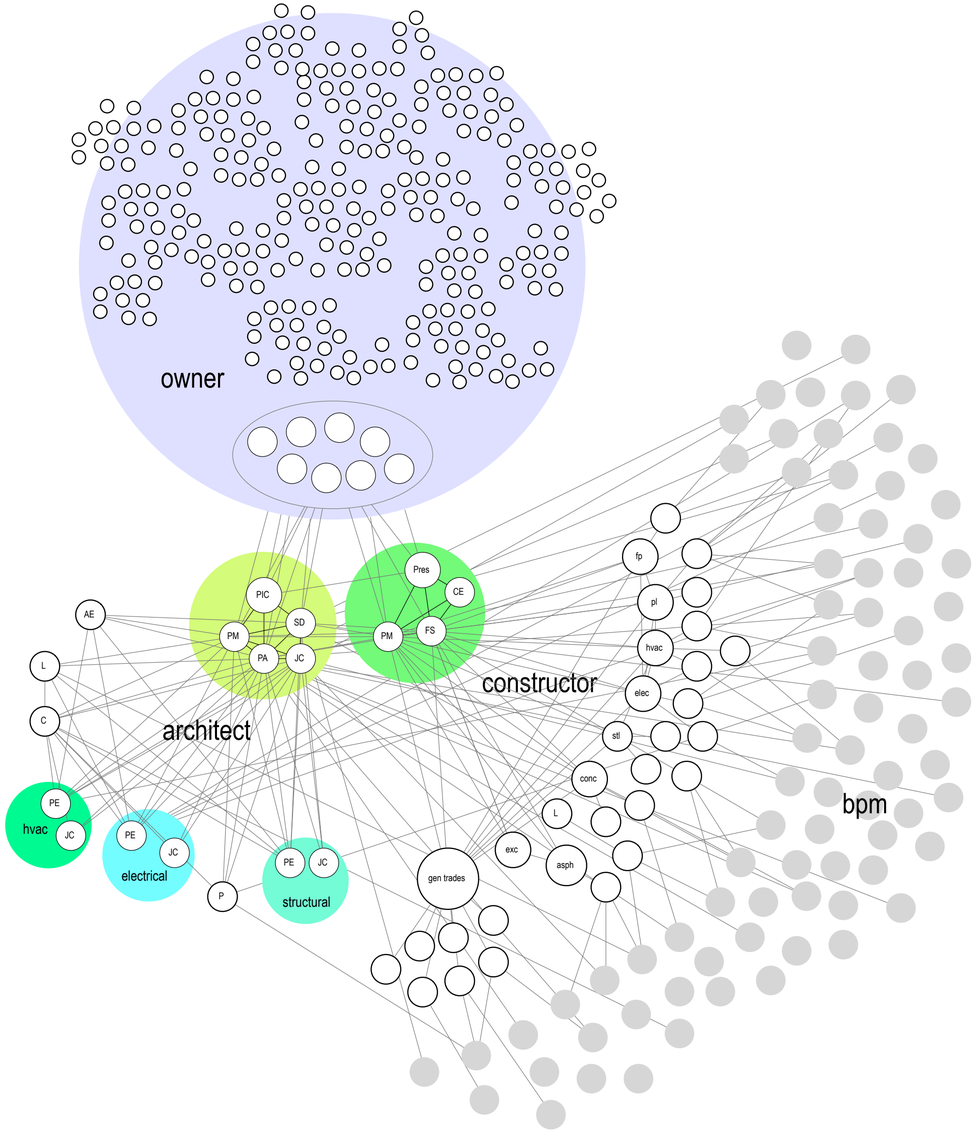










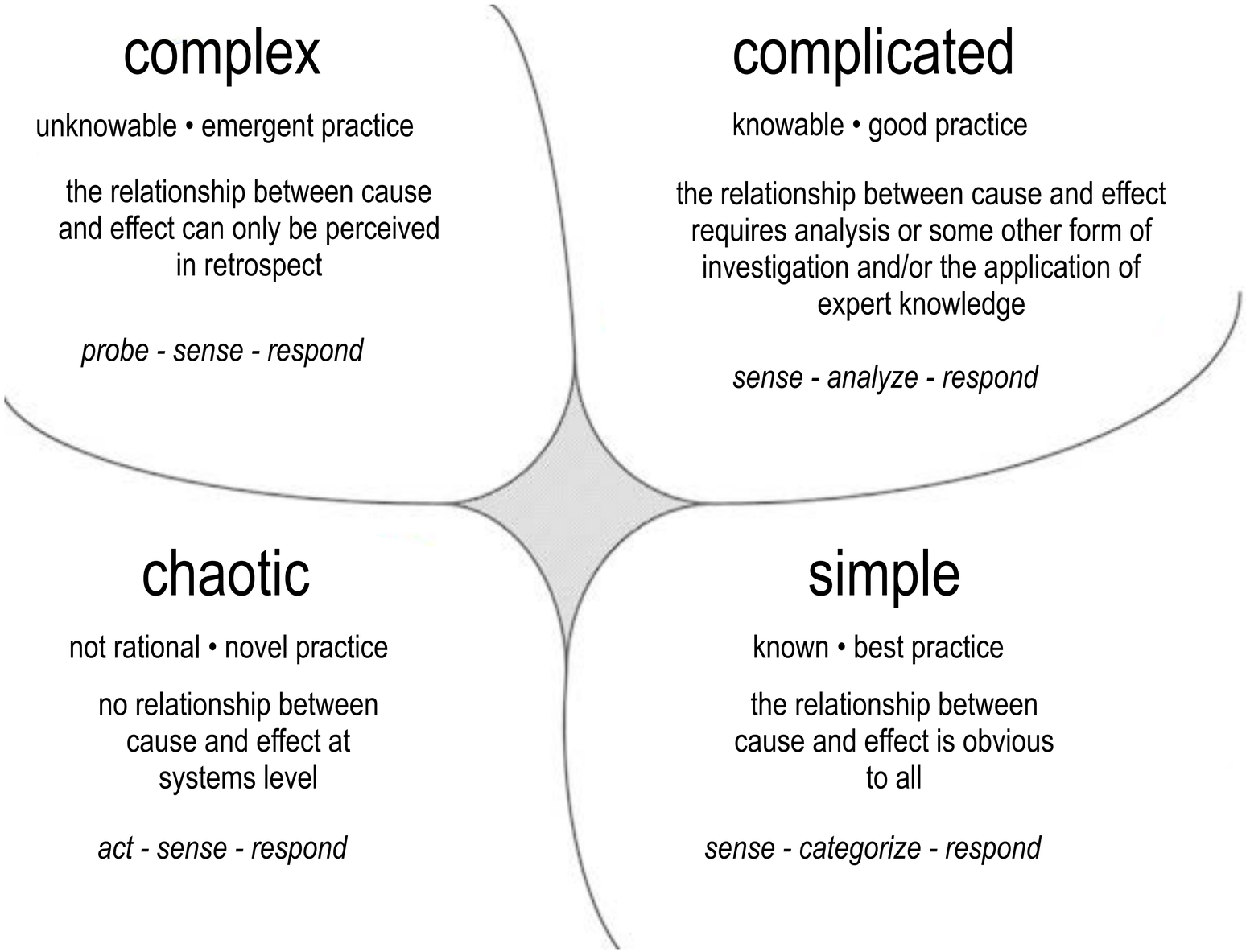


teams and projects are living networks

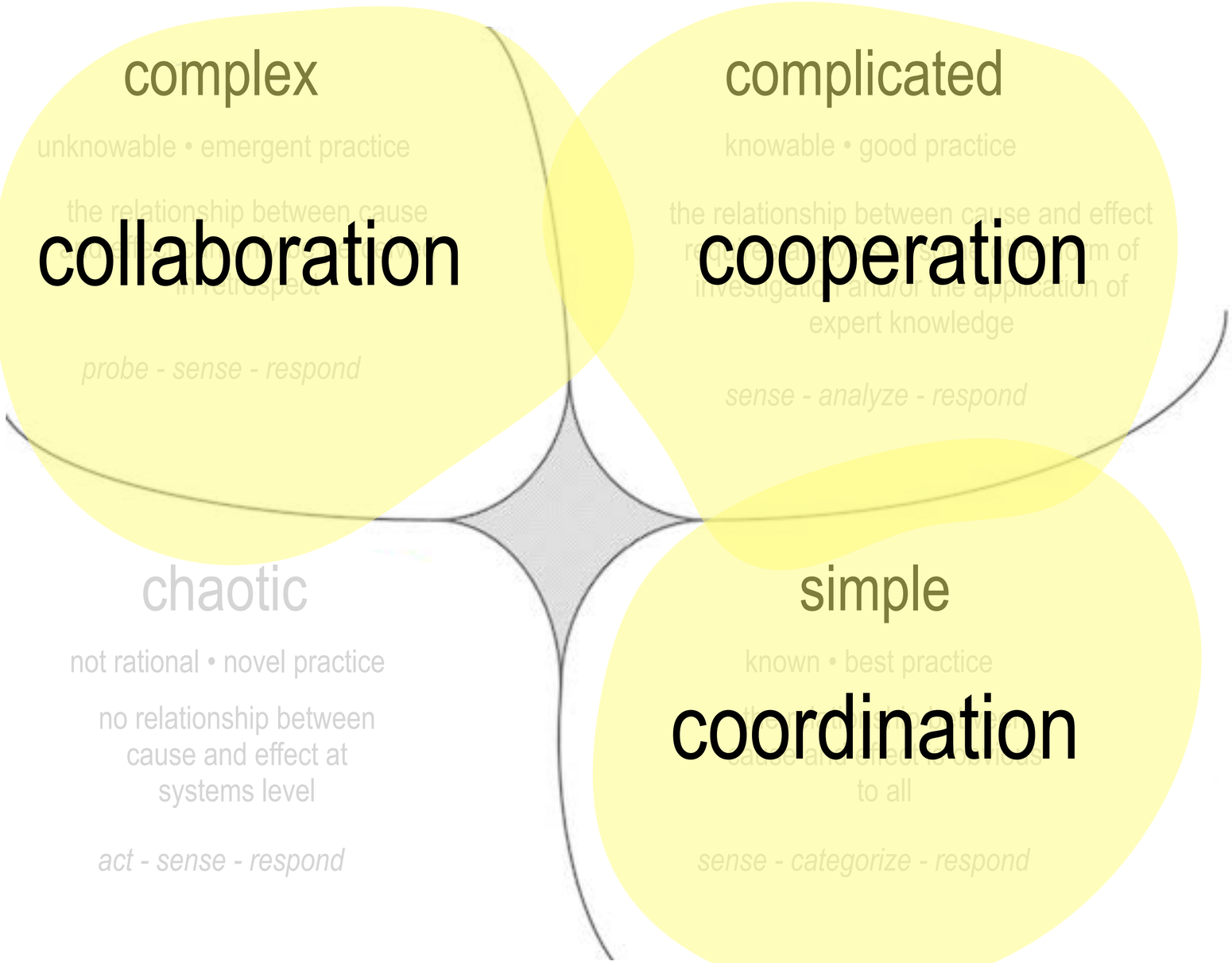
culture

not

contracts



source: Dave Snowden, Cognitive Edge



source: Dave Snowden, Cognitive Edge

what is collaboration?

- Effective communication
- Common goals / shared vision
- Open-mindedness / flexibility
- Active listening
- Respect
- Trust
- Teamwork

collaboration

projects are networks of decisions and commitments
people are connected by purpose
companies are abstractions

why is this a good thing?

what's different

ipd is about understanding the ramifications of design decisions at the time the decisions are made

what's different

design to detailed estimate vs estimating detailed design

what's different

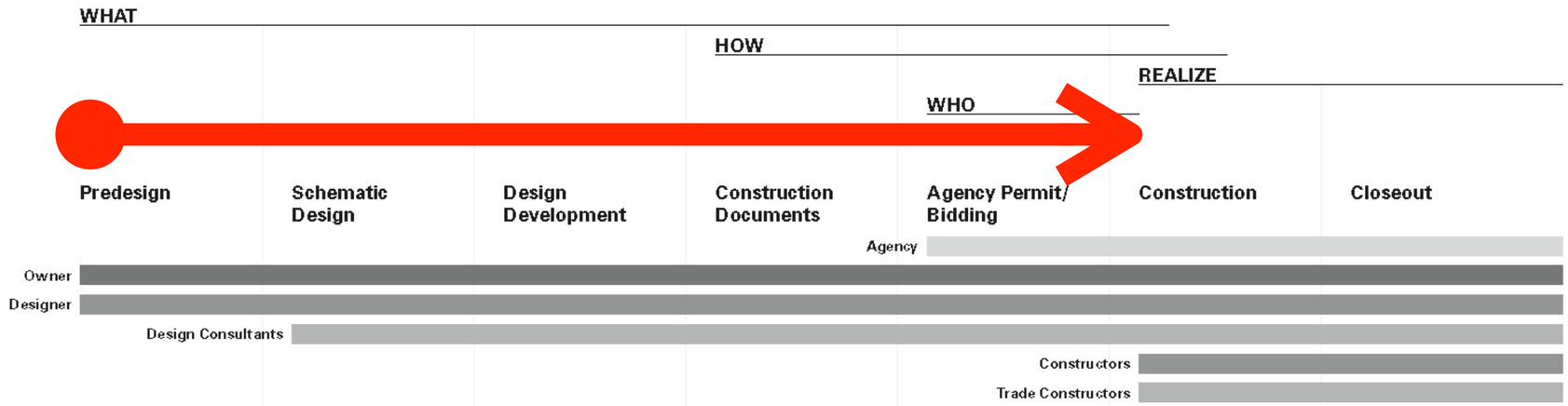
make everything

visual, explicit,

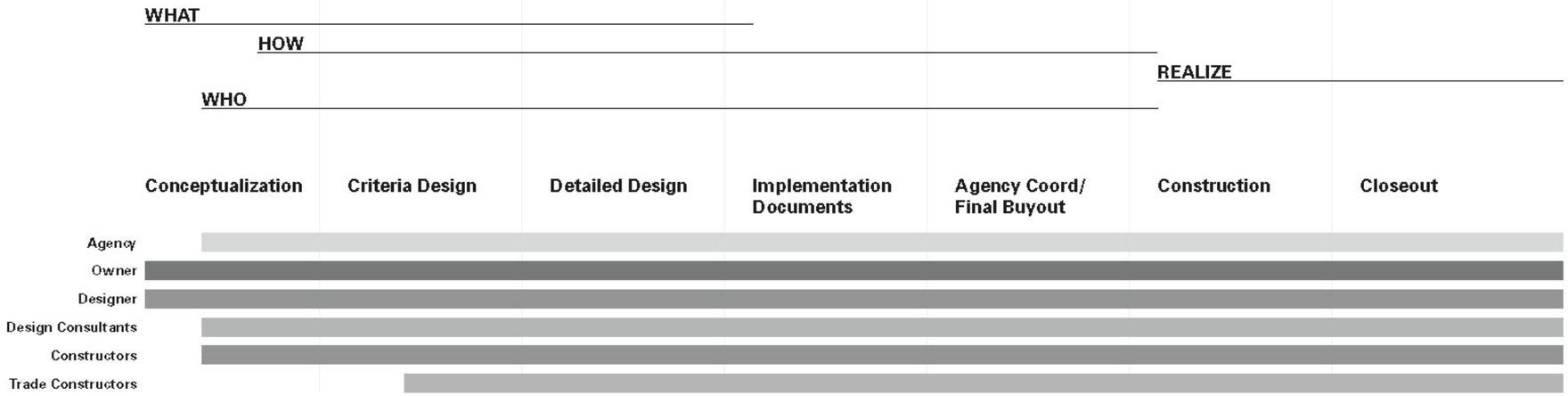
transparent

time to project certainty

Traditional design process

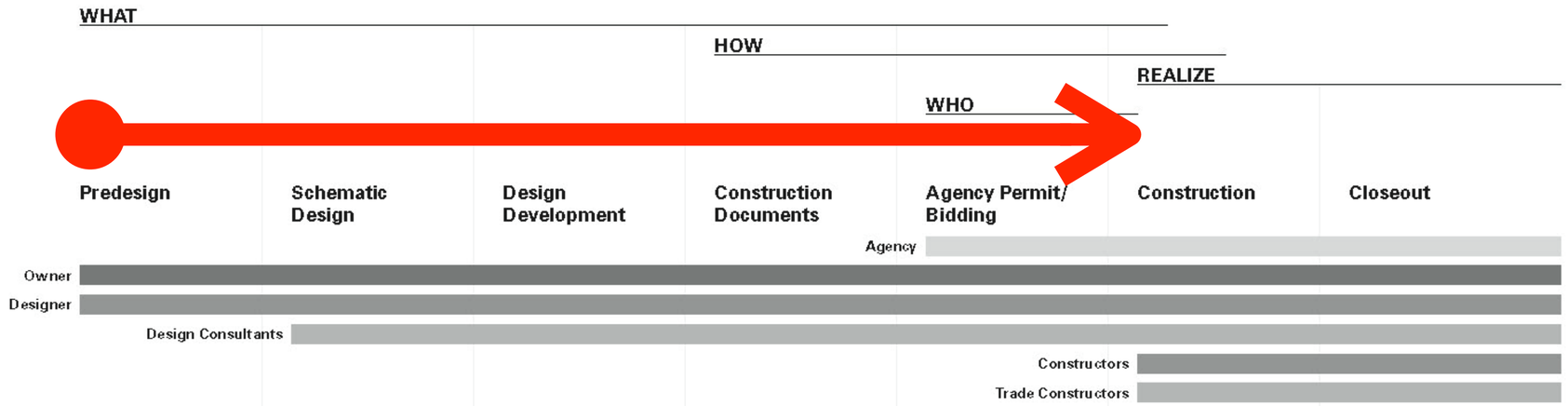


Integrated design process

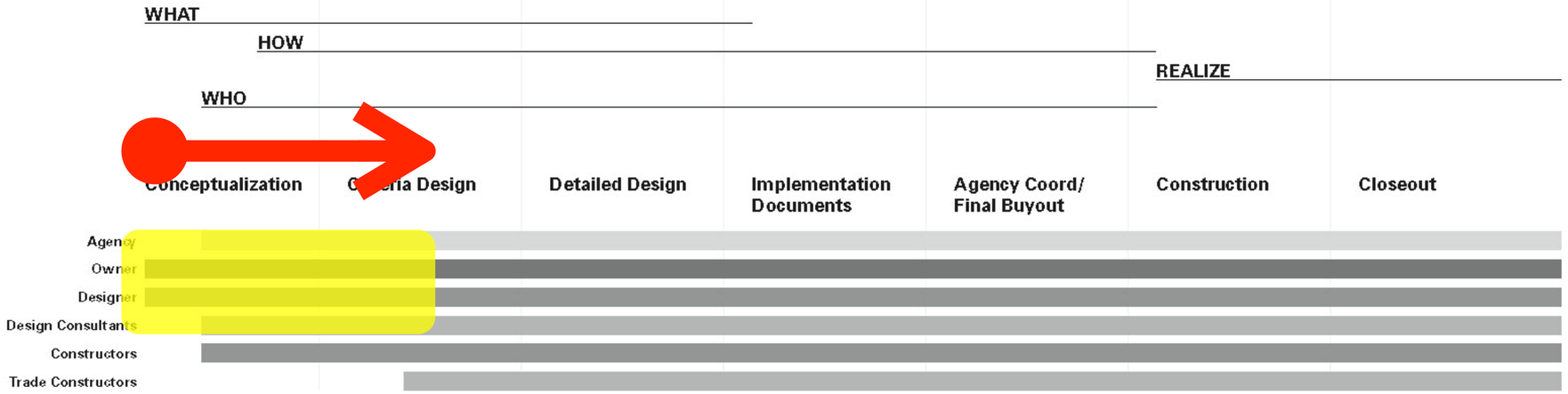


Diagrams from AIA/AIACC's 2007 "Integrated Project Delivery: A Guide

Traditional design process



Integrated design process



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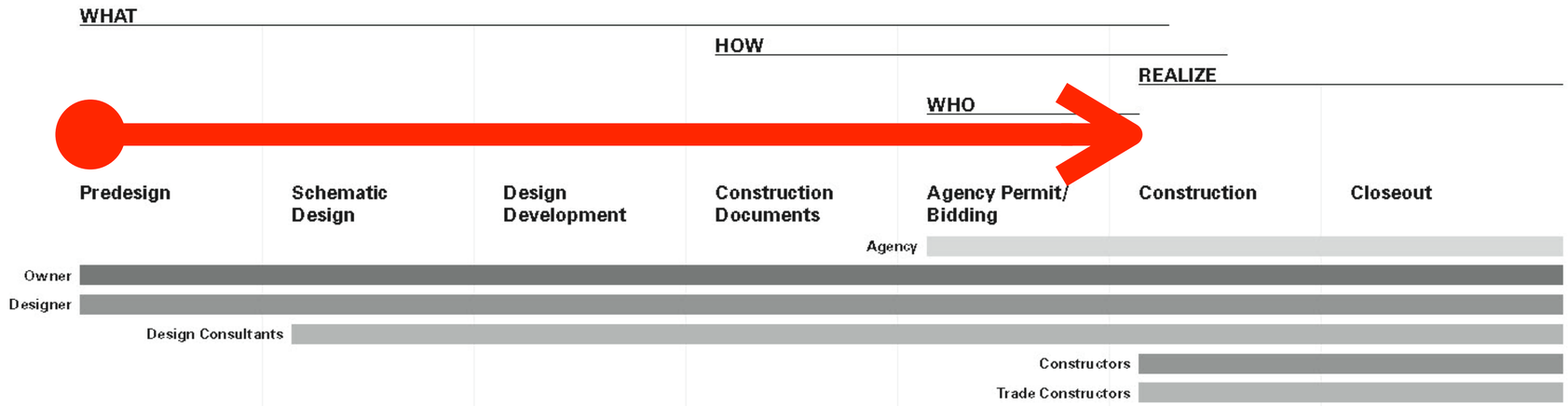

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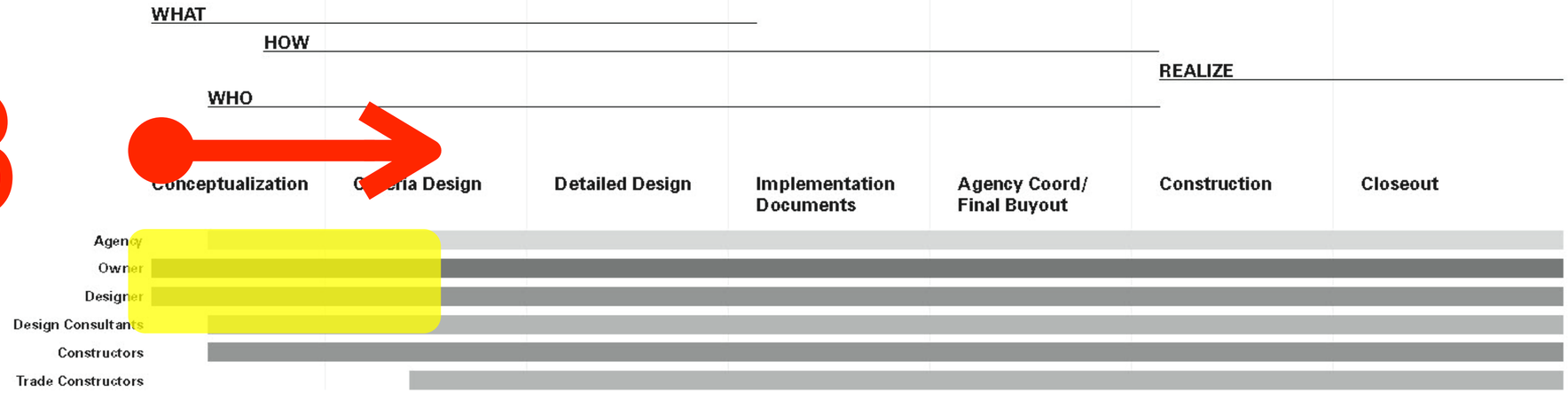


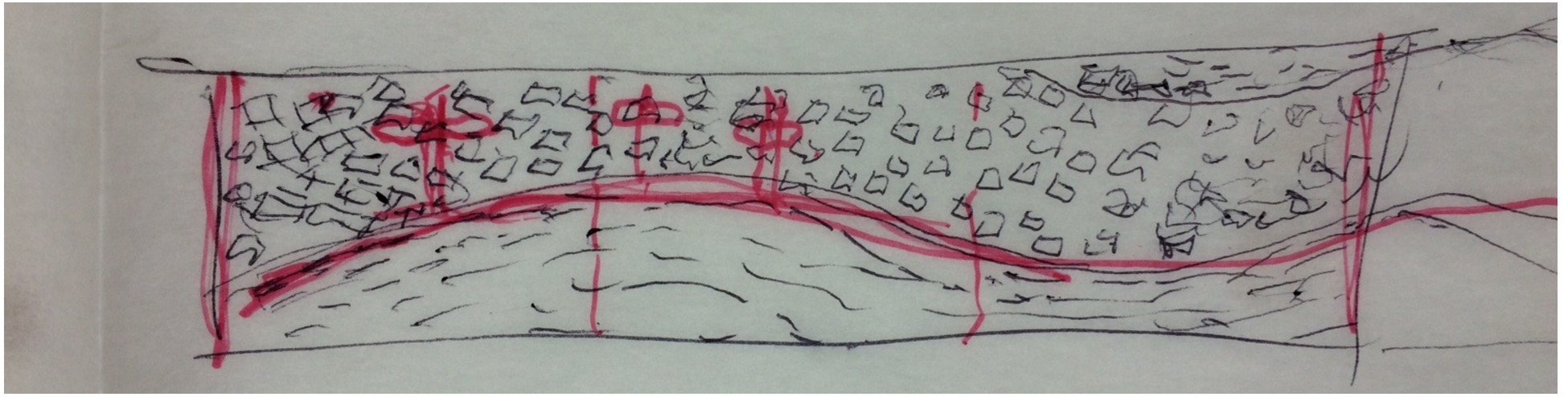
~1/3

Diagrams from AIA/AIACC's 2007 "Integrated Project Delivery: A Guide

Only the information necessary for the team (including the owner!) to say, with confidence:

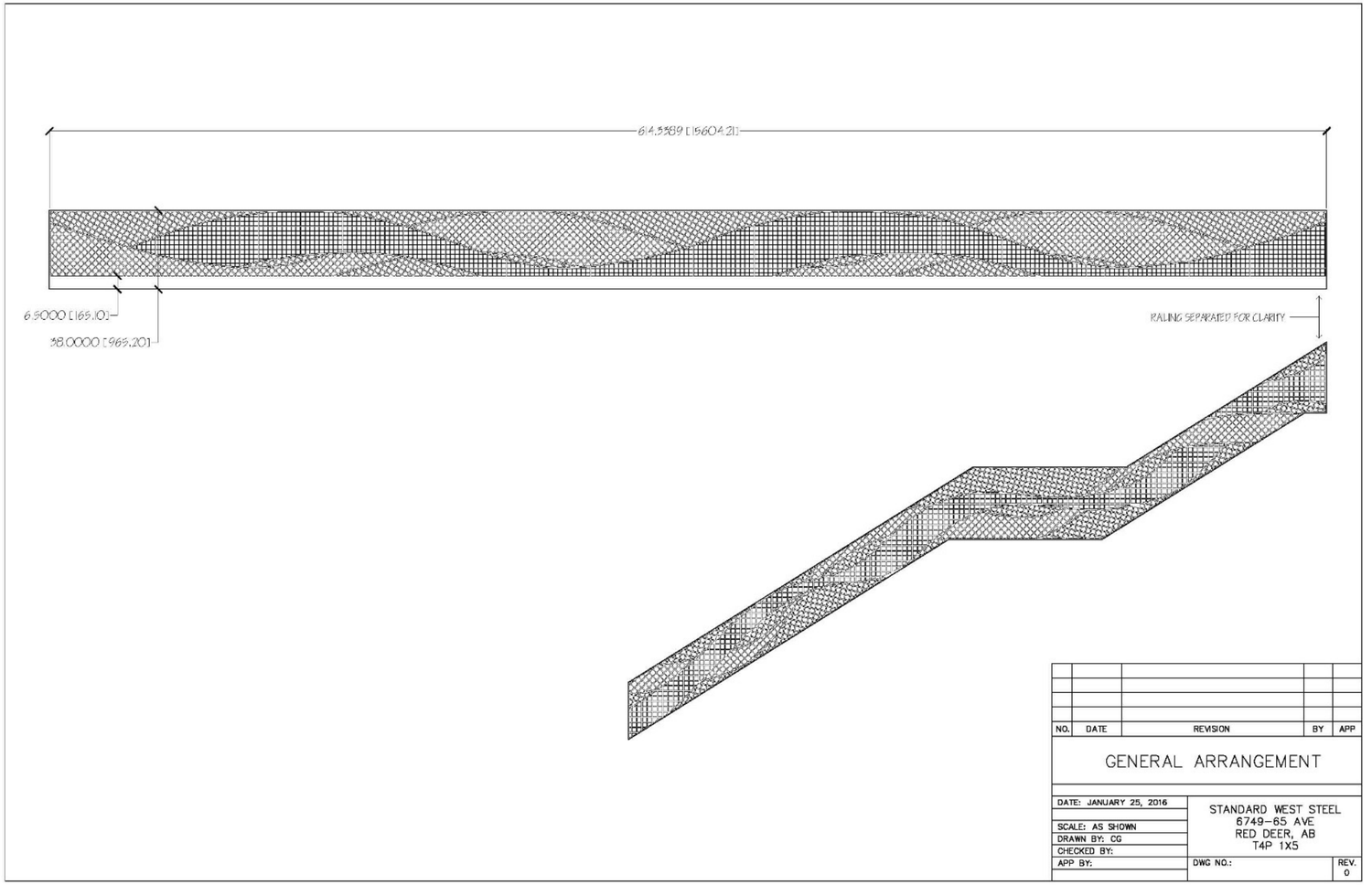
"We can build this building, that does these things, for this much money, in this much time"

IPD can maximize value delivered



courtesy Group2 Architects

courtesy Group2 Architects

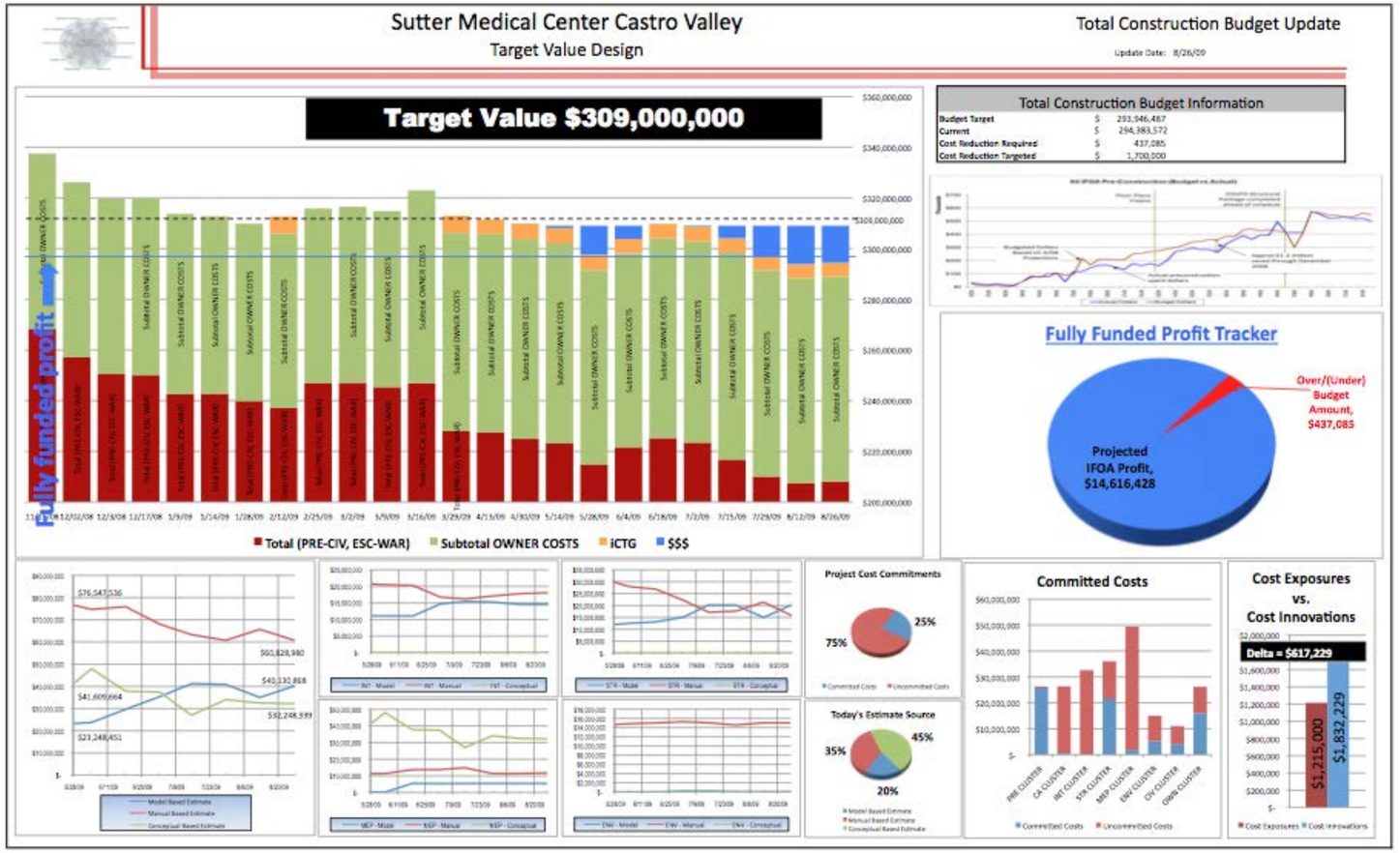


courtesy Group2 Architects

courtesy Group2 Architects

rigorous decision making

visible / visual / transparent



visible / visual / transparent

Project Risk Register - Barrie First Responders Campus

No	Description	Probability	Impact: Schedule	Impact: Scope	Impact: Quality	Impact: Cost	Impact Multiplie	Probability / Impact Coefficient (Max 1 pts)	Mitigation Strategy	Potential Cost ($)	Coefficient Weighted Cost ($)	Action PITs	Assessment (Max 100 pts)	
1.1	Land Procurement	2	5	3		5	13	0.26	Increase Offer…..	$ 3,000,000.00	$ 780,000.00	Owner	26	2/3 land costs + 1/3 validation rework
1.2	Environmental Assessment Phase II Results	5	1			3	4	0.2		$ 1,000,000.00	$ 200,000.00	Owner	20	
1.3	Geotechnical (unknowns)	1	2	2		3	7	0.07		$ 5,000,000.00	$ 350,000.00	Owner	7	based on $55/m2 of site
1.4	Archaeology Stage II Results (maybe Stage III…)	5	3			2	5	0.25		$ 250,000.00	$ 62,500.00	Owner	25	based on 4-6 month delay
1.5	Natural Heritage Planning	1	2			2	4	0.04		$ 200,000.00	$ 8,000.00	Owner	4	impact on Landscape Design
1.6	Species at Risk	3	2			2	4	0.12			$ -	Owner	12	
1.7	MTO + Traffic (HWY + Road)	5	1	2		3	6	0.3		$ 900,000.00	$ 270,000.00	Owner	30	based on $250-300K traffic report + site cost
1.8	Site Plan Issues (i.e. building height)	1	1	5	1	3	10	0.1			$ -	Architectural	10	
1.9	Scope Changes Post Validation (During DD)	2	2	3		3	8	0.16	have a thorough programming and Client reviews to minimize these changes	$ 650,000.00	$ 104,000.00	All	16	% of validation
1.10	Exposed Structures vs Not Exposed Structures	0	0	0	0	0	0	0	DESIGN DECISION		$ -	Architectural	0	
1.11	Material Price Swings	5				5	5	0.25		$ 2,000,000.00	$ 500,000.00	Costing	25	Assumed @5% of $40M
1.12	Labour Availability and Price Swings	1	2			3	5	0.05		$ 1,200,000.00	$ 60,000.00	Costing	5	Assumed @3% of $40M
1.13	Unforeseen Weather Conditions	1	3			3	6	0.06			$ -	Costing	6	
1.14	Code + Regulation Changes	1	1	1		1	3	0.03			$ -	Architectural	3	
1.15	LEED Impacts	0	0	0	0	0	0	0			$ -	Architectural	0	
1.16	Target Design is Greater than Validation Budget (at end of DD)	1	3	4		5	12	0.12			$ -	Costing	12	
1.17	Unanticipated Consultants (Input / Requirements)	2	1	1		3	5	0.1		$ 200,000.00	$ 20,000.00	Costing	10	50-50 design cost and impact on scope
1.18	US/CAD Dollar Value Swings / World Market Influences	3				5	5	0.15		$ 1,600,000.00	$ 240,000.00	Costing	15	Assumed @2% of $80M
1.19	The "Trump" Factor	5	0	0	0	0	0	0			$ -	**Bill Lett Jr.**	0	
1.20	Land Purchase complications (COB Approvals + Budget Available)	4	5			2	7	0.28			$ -	Owner	28	
1.21	Land Seller Does Not Agree to Price Offered	0	0	0	0	0	0	0			$ -	Owner	0	
1.22	COB/COS/BPS Acceptance and Approval of Project Delays/Complications	2	5	5		2	12	0.24			$ -	Owner	24	
1.23	Loss of Key Stakeholders (over Project Duration)	1	4			3	7	0.07			$ -	All	7	
1.23	Loss of Key Team Members (over Project Duration)	4	1				1	0.04			$ -	All	4	
1.24	Negative Feedback from Public	4	1				1	0.04			$ -	Communications	4	
1.25	Probability of Not Meeting Validation Timeline / COB/COS/BPS Dates	1	5			2	7	0.07			$ -	Documentation	7	
1.26	Lack of Local Ward / Councillor Support	1	0				0	0			$ -	Owner	0	
1.27	Re-election Timing / Impact on Decision Making Process (2018 Fall)	1	5	3		4	12	0.12			$ -	Owner	12	
1.28	Design Information keeping up with progress of construction (Quality + Confidence)	1	5			3	8	0.08			$ -	Architectural	8	
1.29	LEED Requirement Shortfalls (design changes to achieve points)	2		2		4	6	0.12			$ -	Architectural	12	
1.30	Utility Availability / Adequacy	1	3			4	7	0.07			$ -	Civil	7	
1.31	Environmental Approvals Complications (MOE)	2	5	2		4	11	0.22			$ -	Electrical	22	
1.32	Zombie Apocalypse	0	0	0	0	0	0	0			$ -	**Markku**	0	
1.33	Equipment and Supply Chain Lead Times		x				0	0			$ -	Costing	0	
1.34	Downstream Storm Capacity			x		x	0	0			$ -	Civil	0	
1.35	Unknown Site Conditions (Existing Wells)	3	5	3		3	11	0.33		$ 100,000.00	$ 33,000.00	Costing	33	
1.36	New Road Installation to the Rear		x	x		x	0	0			$ -	Owner	0	
1.37	Harvie Rd. Overpass Completion (2018)		x			x	0	0			$ -	Owner	0	
1.38	Approvals of Revised Building Program		x	x			0	0			$ -	Owner	0	
1.39	Loss of Project Team Member(s) and their Work + Information		x	x	x	x	0	0			$ -	All	0	
1.40	Subtrade Project Partners Not Working Out		x	x	x	x	0	0			$ -	Costing	0	
1.41	Construction Start Timing		x			x		0			$ -	Costing	0	
1.42	Radio Communications			x	x	x					$ -	Electrical	0	
											$ 2,627,500.00	Total		

BARRIE FIRST RESPONDERS CAMPUS PROJECT

DECISION MATRIX

DM-002

PIT: **Structural** LOCATION: [redacted]

Project values will be used to guide the team in decision making. Use this matrix on any major decision document that grades the decision on its affect (red, yellow, green) on the overall project values. Where there is a conflict between values, the document should discuss how the conflict will be resolved.**If a decision doesn't affect a value, the team should question the necessity of the action.**

Decision Outline

To establish general direction on the structural systems and assess the holistic impact considering not only the structure but the varying building heights, amount of envelope, mechanical systems due to varying volumes, etc….

NOTES

4 Options to be reviewed:
1. Concrete Flat Slab (w/drops)
2. Concrete Flat Plate (w/o drops)
3. Composite Structural steel with concrete on steel deck
4. Structural Steel supporting Precast

Option 1: Concrete Flat Slab	EFFECT of DECISION: POS	NEU	NEG	N/A
Sustainability + Longevity	1			
Fit For Purpose + User Satisfaction	1			
Efficiency + Innovation	1			
Community Satisfaction + Engagement				1
Aesthetics	1			
Safety				1
Collaboration + Relationships				1
Learning + Growth				1
Totals	4	0	0	4

Option 2: Concrete Flat Plate	EFFECT of DECISION: POS	NEU	NEG	N/A
Sustainability + Longevity	1			
Fit For Purpose + User Satisfaction	1			
Efficiency + Innovation	1			
Community Satisfaction + Engagement				1
Aesthetics	1			
Safety				1
Collaboration + Relationships				1
Learning + Growth				1
Totals	4	0	0	4

Option 3: Composite Struct Steel	EFFECT of DECISION: POS	NEU	NEG	N/A
Sustainability + Longevity	1			
Fit For Purpose + User Satisfaction		1		
Efficiency + Innovation	1			
Community Satisfaction + Engagement				1
Aesthetics		1		
Safety				1
Collaboration + Relationships				1
Learning + Growth				1

Barrie First Responders Campus
Assumptions Log
February 25, 2017

	Description / Comments	Decision Matrix #
Scope	HST excluded	
	Construction start date	
	There will be 2 separate building blocks; 1) Police / EMS Headquarters; 2) Fire / Training Centre / Garage linked by an enclosed bridge	
	The Police / EMS Headquarters building will be distributed on 4 Levels, including 1 Basement Level	
	The Fire / Training Centre / Garage building will be distributed on 2 Levels, both above grade	
	The slab-on-grade of both buildings will have the same finished floor elevation	
	Police / EMS - space distribution on each floor	
	Fire - space distribution on each floor	
	Training - space distribution on each floor	
	Floor height	
	The following elevators will be located in the Police / EMS Headquarters; 2 elevators (1 passenger and 1 Oversized passenger elevator) in the Police spaces accessing all 4 levels; 1 Freight Elevator accessing Level 1 and 2 will be dedicated to EMS; 1 Passenger Elevator accessing Level 1 and 2 will be dedicated to Forensics;	
	1 dedicated passenger elevator will access both floors of the Training Centre / Garage building	
	A vertical shaft will be provided for the future dedicated passenger elevator accessing the EMS 3rd Floor space for future growth	
	The type of car wash will be drive-through in-lieu of self serve	
	Number of Fueling stations; fueling stations will not have diesel	
	The building will be designed to meet the requirements for LEED Gold	
Site/Civil	Surface parking area / number of stalls	
	Interior parking area / number of stalls	
	Separate covered parking structure is excluded	
	Off site Utility improvements included? This has been asked of the City regarding works proposed for Fairview Road	
	Utility connection costs outside property line included?	
	Traffic Lights?	
	Heavy duty asphalt paving in drive lanes	
	Light duty asphalt paving in parking stalls	
	Design of HD and LD to be reviewed and compared with geotechnical report	
	Aspalt paved areas based on life cycle span of X years (10, 20 or 25 years)	
	Demolition of existing structures? Decommission of well/s	
	Remove contaminated soils?	
	Remove existing fill under and/or outside building footprint	
	The proposed building foundations will be found on understurbed ground	
	Downstream drainage improvements cleaning and reshaping existing storm drainage outlet channel (leading into culvert along Bayview Drive, east of property) - survey to assess capacity	
Structural	Police / EMS Headquarters building will be a post-disaster building	
	The foundation system will consist of standard foundations - i.e. spread and strip footings	
	The top of footing elevation in areas not exposed to frost conditions will be at -250mm from the SOG elevation	
	The top of footing elevation in areas exposed to frost conditions will be at -1200mm from the SOG elevation	
	Cast-in-place concrete structure - Specific BLDG Areas	
	Steel structure - Specific BLDG Areas	
	Describe SOG	
	Describe suspended slabs - flat plate vs slab and drops	
	All floors are designed to 100 lb/sf (4.8Kpa) live load including partition allowance	
	Exposed structure in common areas	
Envelope	Wall effective R-Value	
	Roof effective R-value	
	Basement has exterior insulation, waterproofing, weeping tile?	
	Exterior Envelope finish - Masonry to 4200mm. EIFS above?	
	Curtain Wall Area 1	
	Curtain Wall Area 2	
	Storefront windows on 1st floor	
	SBS membrane roof system	
	Insulated metal wall panels on the penthouse	
	2 overhead doors, 1 dock leveller?	
	Exterior entrance canopy soffit to be suspended linear metal?	
Interiors		
Mechanical	Dual-fuel boiler plant including pumps and piping for distribution of heated water to perimeter heating terminals throughout the buildings. The boiler plant will be served from emergency electrical power.	
	Water-cooled chiller plant comprising chillers, open evaporative cooling towers, pumps and piping for distribution of chilled water to air handling unit cooling coils.	
	The CUP will be located in the basement level on the south side of the Police / EMS Headquarters	
	Central-station (or roof top) type air handling units and connecting ductwork for distribution of supply and return ventilation air throughout the buildings. Air handling units will be zoned appropriately to space uses and operating schedules. No redundancy in air handling units has been assumed.	
	Cooling air will be delivered to in all areas requiring air conditioning. Other spaces not requiring cooling will be served by heating and ventilation air handlers or ventilation fans, as appropriate. Space temperature control through the use of variable air volume terminals.	
	Exhaust ventilation systems for washrooms and for general exhaust, complete with ductwork distribution systems.	
	Mechanical cooling for the elevator rooms.	
	Mechanical cooling (N+1 level of redundancy) for the main data room.	
	Natural gas distribution from the meter, adjacent to the building, to the boiler plant and roof penthouses.	
	Fuel oil systems for boilers and emergency generators.	
	Air and water balancing.	
	Building automation system for space temperature monitoring and control and for the control and monitoring of the major mechanical equipment.	
	Storm drainage system comprising roof drains, rainwater leaders and connecting piping. Drainage piping will be cast iron or plastic piping as permitted by code. Roof drainage will not be controlled-flow type.	
	Radiant floor (or top) heat in interior vehicle parking areas and training facility	
	In-floor system included in fire training	
	Fuel tanks will be double wall type located above ground. These tanks will be adjacent to the generators and close to the boiler plant	
	Air compressors and distribution piping will be provided for shop air for the EMS and police garages	
	CO and NO2 detection for garages included.	
	Maintenance fluids for garages excluded - part of FFE package	
	Garage lifts excluded - part of FFE package.	
Sprinklers	Automatic wet sprinkler protection throughout - TBC - Approach to Gun Range	
	Fire standpipe and hose system	
	Fire pump - water pressure test is required	
	Preaction sprinkler system and clean agent protection in main data room	
	Clean Agent System in Evidence Storage	
	Fire extinguishers throughout	
	Vandal resistant sprinkler heads in detention spaces	
Electrical	2 Fibres - From 2 Different Providers - Fed From 2 Different Ends of Building	
	Cat6a Cabling in Police and Fire, Cat6 Cabling in EMS	
	Cabling based on 2 outlets per workstation (6 per in dispatch areas)	
	Telephone System for Fire and EMS - Separate Systems, approx. 400 handsets (Police complete - Fire and EMS infostructure only)	
	PA system based on general coverage, separate zones - tied to fire alarm for Mass notification	
	Sound masking in EMS area only (TBC)	
	Asset tracking system for police only	
	cell boosting in basement levels only	
	Primary duct bank based on 100m total	
	High Voltage transformer based on 3 meg tamper proof unit	
	Max distance from main high voltage transformer to main electrical service to be 35ft	
	Main service to be max 4000amp complete with ground fault and standard molded case distribution breakers	
	Generator package based on 3 - 600kw, CSA, 282 exterior enclosures complete with 4 hour day tanks	
	Emergency switchboard maximum to be 2500amps c/w standard molded case breakers	
	Training gun range and police fleet to be considered non post disaster	
	Finished ceilings in all areas except for garages, storage areas, janitor and M&E type rooms	
	Mechanical contractor is providing all VFD's required for their equipment	
	All low voltage control including BMS system by mechanical contractor	
	All lighting to be LED commercial grade of medium quality	
	Motion sensors / daylight sensors installed as per practical use and SP10	
	Electrical and I/T. closets to be provided into floor layout to reduce line losses.	
	Police UPS to be sized to 20kva dual output with a battery capacity to provide backup up to 1hour. Unit is future expandable up to 40kva	
	Fire alarm system to be complete with horns and strobes and detection based on fully sprinklered buildings	
	A total of 20 Level 2 non-revenue car charging stations are provided	

visible / visual / transparent

Barrie FRC Validation Resource L

	Week Ending:	9-Dec	16-Dec	23-Dec	30-Dec	6-Jan	13-Jan	20-Jan	27-Jan	3-Feb	10-Feb	17-Feb	24-Feb	3-Mar	10-Mar	17-Mar	24-Mar	31-Mar	7-Apr	14-Apr	21-Apr	28-Apr	5-May	12-May	19-May	Total Hours	Forecasted at Completion	Delta	Hours to Date	Unit Rate	Total Actual Cost
Chandos																															
Chief Estimator (Mike Dolling)		8	8			8	8	8	8	8	8			16	16	16	16	16	16					8	8	176.00					
		9	13				16			16		16														70.00			70.00	$ 65.00	$ 4,550.00
Project Director (Tony Jones)		8	8			16	16	16	16	16	16	8	8	8				8			8			8	16	176.00					
		9	13					8	16	16	16	16	16													110.00			110.00	$ 65.00	$ 7,150.00
Director Innovation (Markku Allison)		8	8			8	8	8		8				8												56.00					
		9	13				16	8																		46.00			46.00	$ 79.40	$ 3,652.40
IPD Trainer (Jen Hancock)		8	8			8	16																			40.00					
		9	13				10																			32.00			32.00	$ 79.28	$ 2,536.96
Executive Vice President (Nic Darling)		8	8			16	16	16	16	17	16	16	16	8		8		8			8		12	8	197.00					
		9	13				16	8	8		16		16													86.00			86.00	$ 101.55	$ 8,733.30
BIM Manager (Alex Bahan)						8	8	8	8	8																40.00					
											2															2.00			2.00	$ 51.70	$ 103.40
Lead Estimator (Derek Ingraham)																		16	16	16	16	8	8	12	9	101.00					
																										0.00			0.00	$ 101.51	$
Senior Estimator (David Kidd)																8	8	8	8	8			8	12		60.00					
																										0.00			0.00	$ 89.33	$
Gillam Group Inc.																															
Executive in Charge (Marcus Gillam)		5	5	0	0	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	6	8	8	8	8	123.00	137.00	14.00			
Actual		16.5	12.5	5	2	4	3	7	3	4	3	3	3	3												69.00			69.00	$ -	$
Forecasted to Complete															5	5	5	5	5	5	6	8	8	8	8	68.00					
Big Room Leader (Joel Parke)		8	9	0	0	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	197.00	160.00	- 37.00			
Actual		0	0	0	0	0	8	16	6	0	0	14	8													52.00			52.00	$ 101.55	$ 5,280.60
Forecasted to Complete														9	9	9	9	9	9	9	9	9	9	9	9	108.00					
Chief Estimator (Domenic Lambo)		8	4	0	0	0	0	0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80.00	140.00	60.00			
Actual		0	0	0	0	0	0	0	16	12	20	20	24													92.00			92.00	$ 65.00	$ 5,980.00
Forecasted to Complete														4	4	4	4	4	4	4	4	4	4	4	4	48.00					
Lead Estimator (Andrew Erlandson)		0	0	0	0	0	0	0	0	0	0	0	0	10	10	11	11	11	24	24	24	24	16	16	16	197.00	197.00	-			
Actual		0	0	0	0	0	0	0	0	0	0	0	0													0.00			0.00	$ 101.51	$
Forecasted to Complete														10	10	11	11	11	24	24	24	24	16	16	16	197.00					
Senior Estimator (Kelvin Mitchell)		0	0	0	0	0	0	0	0	0	0	0	0	5	5	5	5	5	5	5	5	5	5	5	5	60.00	60.00	-			
Actual		0	0	0	0	0	0	0	0	0	0	0	0													0.00			0.00	$ 89.33	$
Forecasted to Complete														5	5	5	5	5	5	5	5	5	5	5	5	60.00					
Project Manager (Ben Valliquette)		8	9	0	0	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	197.00	259.00	62.00			
Actual		16	16	0	0	16	16	16	16	16	16	0	16	16												160.00			160.00	$ 84.87	$ 13,579.20
Forecasted to Complete															9	9	9	9	9	9	9	9	9	9	9	99.00					
		8	8	0	0	0	0	0	0	0	0	0	10	10	0	0	0	10	10	0	0	0	8	8	8	80.00	59.00	- 21.00			
Actual		5	0	0	0	0	0	0	0	0	0	0	0													5.00			5.00	$ 84.87	$ 424.35
Forecasted to Complete														10	0	0	0	10	10	0	0	0	8	8	8	54.00					
Steve Holyk, Donald Guo, Ershad Chowdhury, David Gerhardt, Tesfu		15	18	0	0	0	16	15	15	15	15	40.5	40	45	45	45	45	45	45	45	32	30	30	30	25.5	652.00	193.00	- 459.00			
Actual		15	13.5	0	0	0	16	15	15	15	15	40.5	25.5	22.5												193.00			193.00	$ 129.74	$ 25,039.82
Forecasted to Complete																										0.00					
Sepideh Farsi)		0	0	0	0	0	0	0	0	0	0	0	5	5	5	5	5	5	5	5	5	5	0	0	0	50.00	- -	50.00			
Actual																										0.00			0.00	$ 86.22	$
Forecasted to Complete																										0.00					
Structural Support (Carroll d'Rosario)		0	0	0	0	0	0	0	0	0	0	0	10	10	10	10	10	10	10	10	10	10	2	0	0	102.00	3.00	- 99.00			
Actual													3													3.00			3.00	$ 60.48	$ 181.44
Forecasted to Complete																										0.00					
Mechanical Junior Project Manager (Claire Sorley)		30	12	12	0	0	12	16.1	18	18	18	18	0	12	12	12	12	12	12	12	8	8	8	7	0	269.07	156.85	- 112.22			
Actual		32	13.4	13			13	13.5	13.5	16.75	25.45	16.25	0													156.85			156.85	$ 75.00	$ 11,763.75
Forecasted to Complete																										0.00					
Mechanical Design Manager (David Campbell)		0	0	0	0	0	9	9	9	18	18	0	18	9	9	9	9	9	9	9	4	4	4	0	0	156.00	78.15	- 77.85			
Actual							8.1	7.9	6.4	16.5	23.75	0	15.5													78.15			78.15	$ 95.00	$ 7,424.25
Forecasted to Complete																										0.00					
Electrical Project Estimator (Joe Southorn)		0	0	0	0	0	0	0	0	0	10	11	4	0	0	0	18	18	5	0	0	0	0	0	0	66.00	- -	66.00			
Actual											7	14														21.00			21.00	$ 79.00	$ 1,659.00
Forecasted to Complete																										0.00					
Electrical General Manager (John Holloway)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	-	-			
Actual																										0.00			0.00	$ 79.00	$
Forecasted to Complete																										0.00					
Electrical Managing Partner (Kevin Sweeney)		0	0	0	0	0	0	15	7.5	10	0	8	0	8	0	8	8	8	0	0	8	0	0	8	0	88.50	- -	88.50			
Actual							7.5	15	7.5	12.5	0	0	7.5													50.00			50.00	$ 79.00	$ 3,950.00
Forecasted to Complete																										0.00					
Electrical Executive in Charge (Tim Southorn)		0	0	0	0	0	7.5	15	7.5	15.5	18	15	15	15	15	15	15	15	15	15	15	8	8	8	8	245.50	- -	245.50			

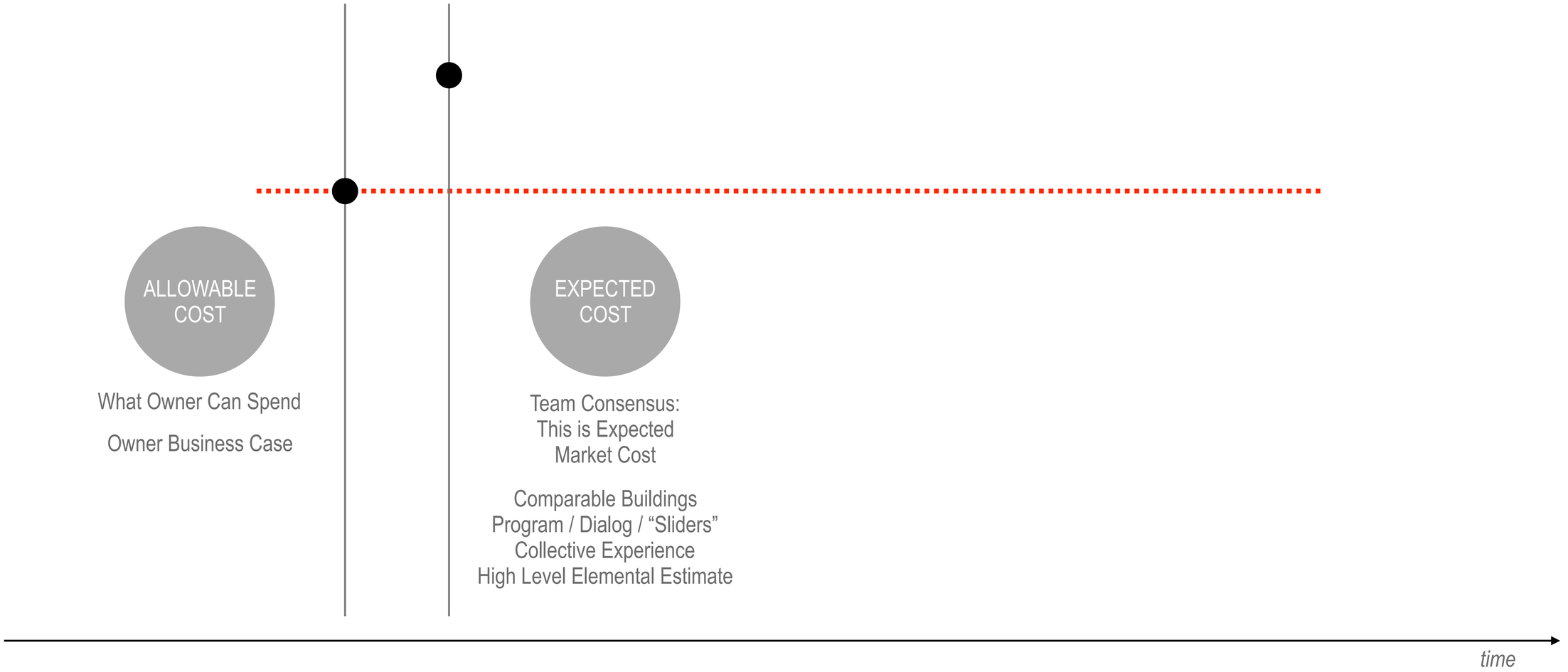
reliability of project outcomes

target value design

THREE NUMBERS

target value design

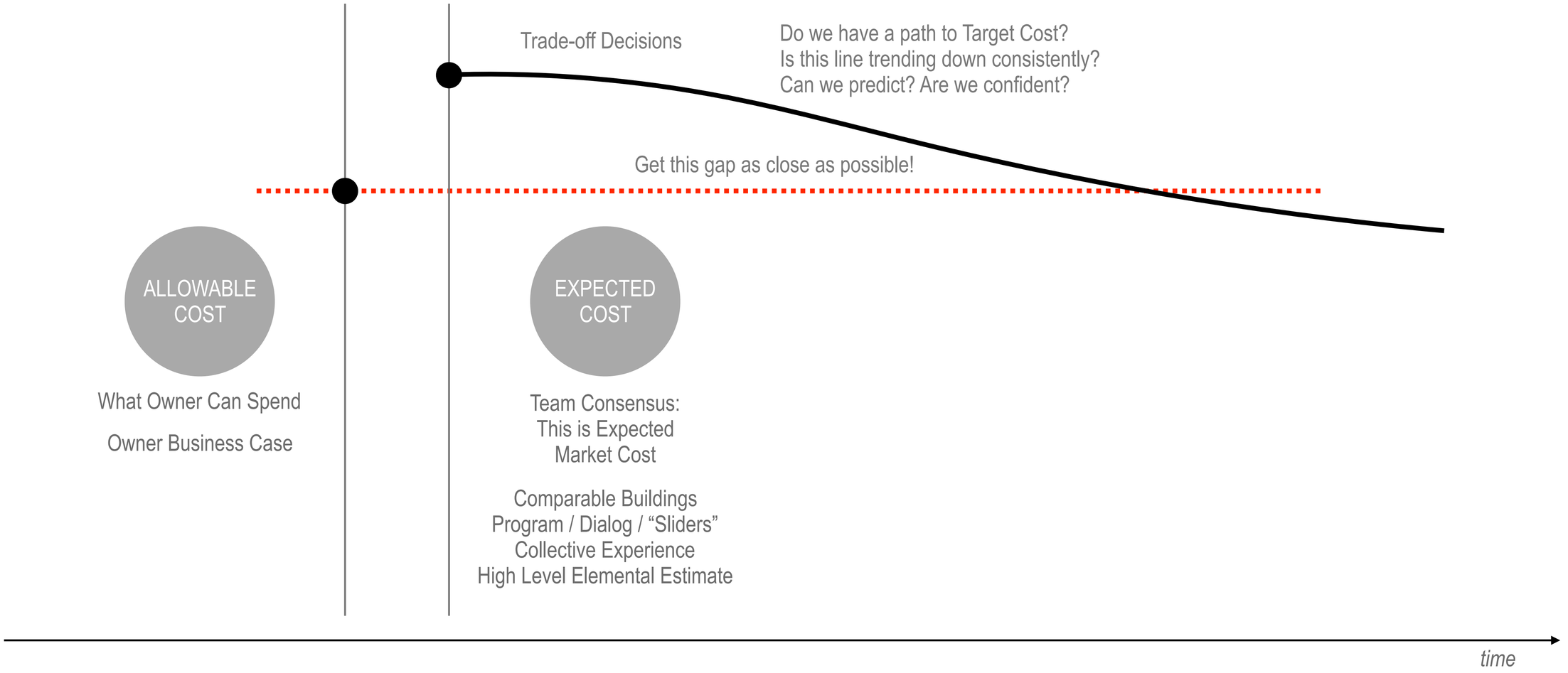
THREE NUMBERS



CHANDOS

target value design

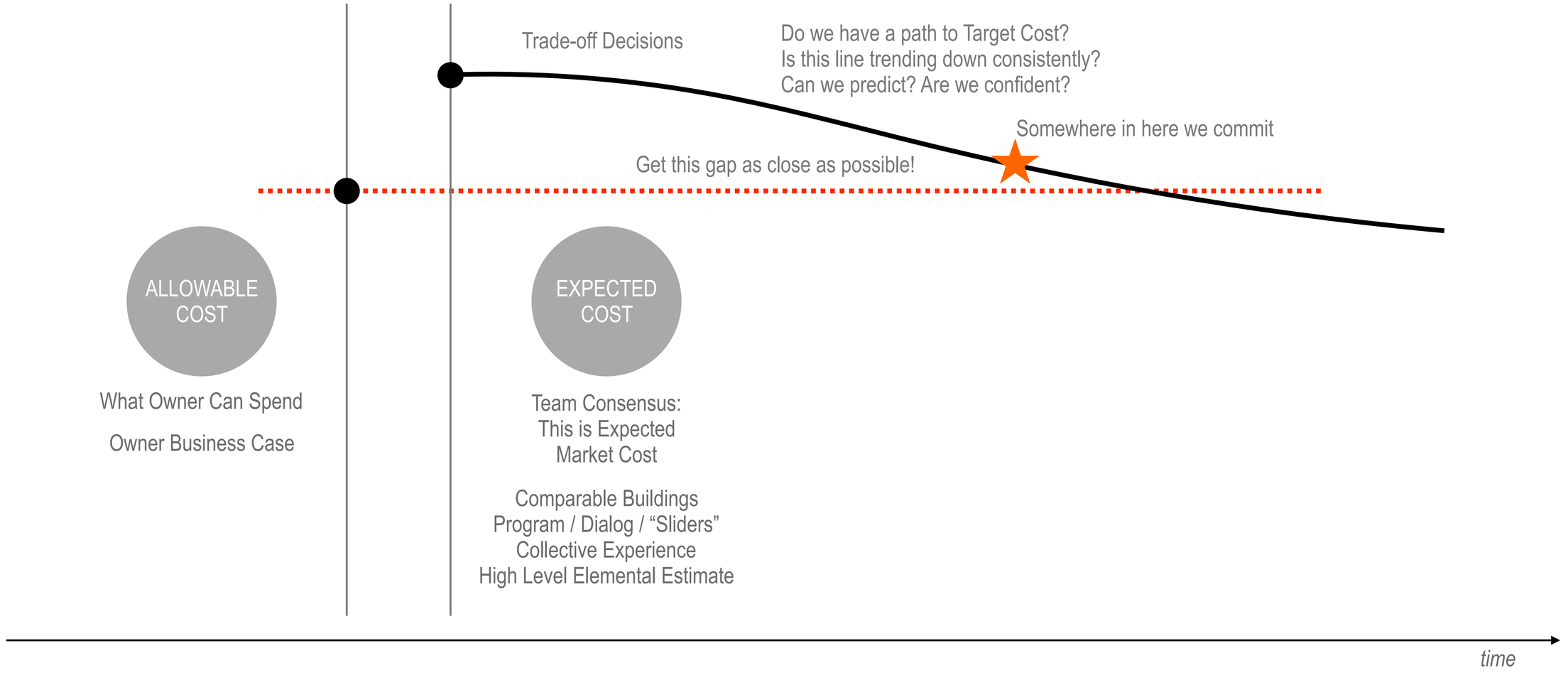
THREE NUMBERS



CHANDOS

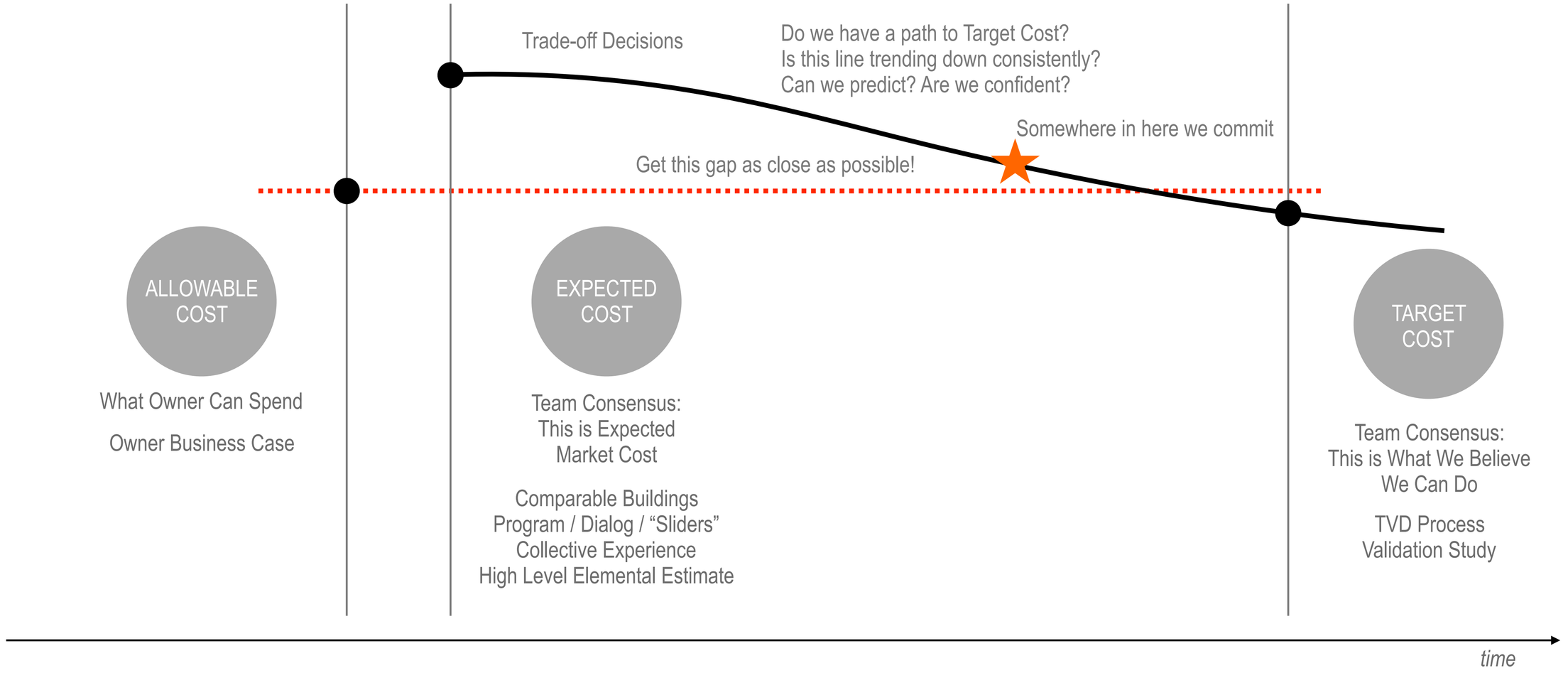
target value design

THREE NUMBERS

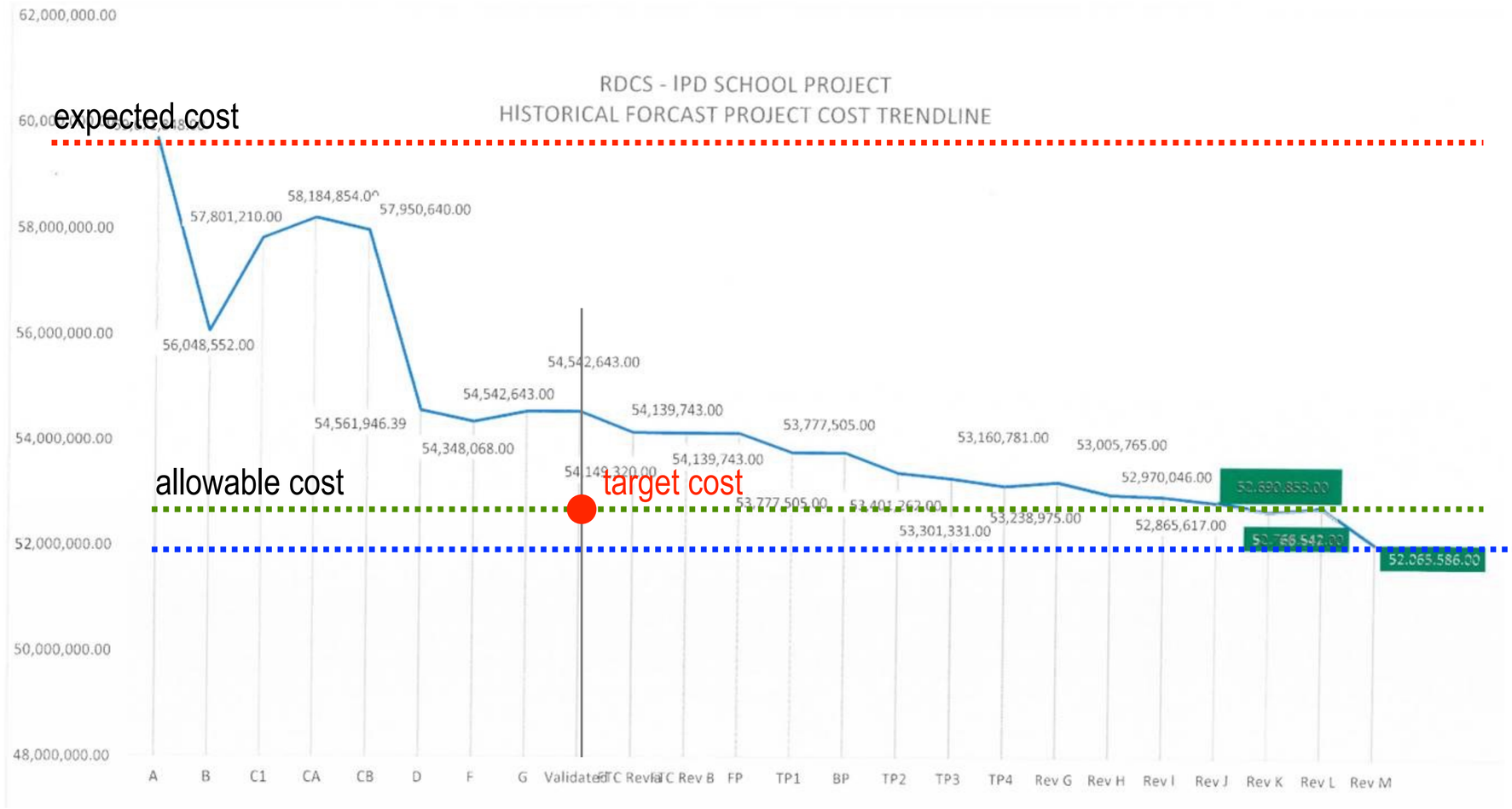


target value design

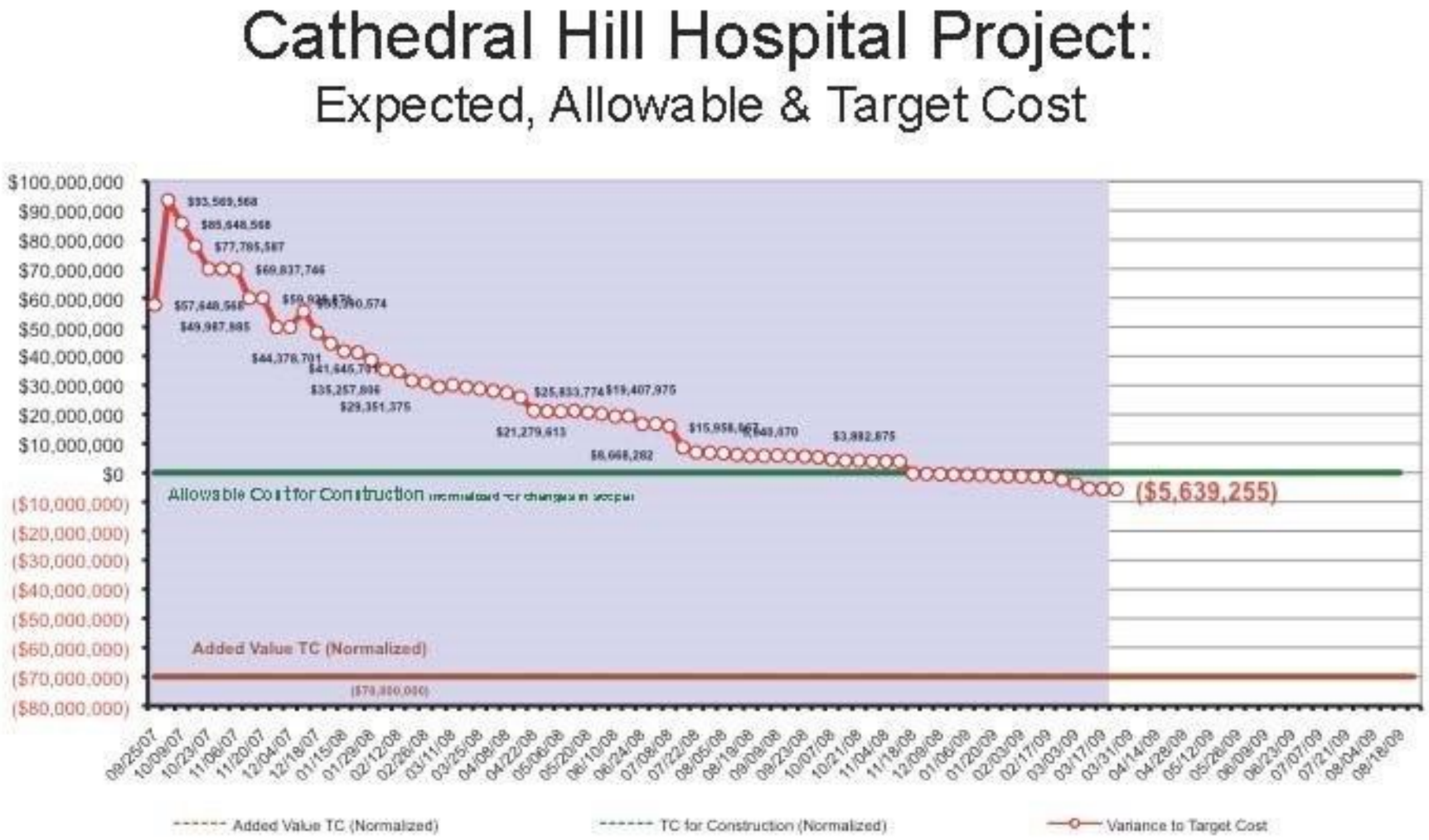
THREE NUMBERS



project costs



project costs



project costs

Click to Enter

MOTIVATION AND MEANS:
How and Why IPD and Lean Lead to Success

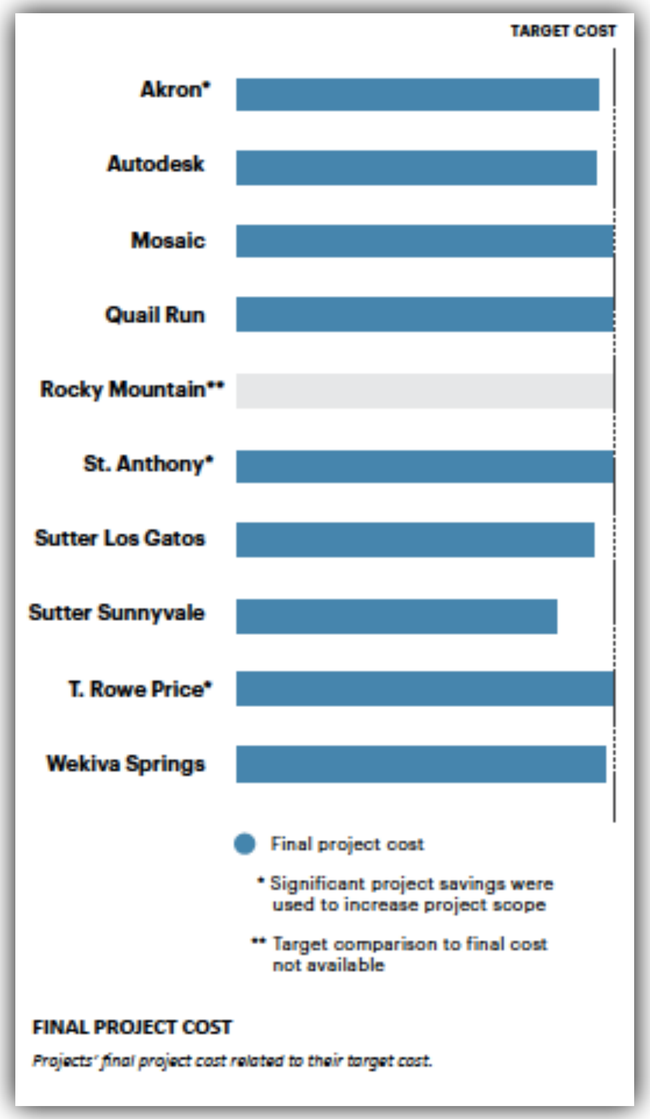
Research Report
November, 2016

University of Minnesota in collaboration with University of Washington, University of British Columbia, Scan Consulting
Sponsored by Integrated Project Delivery Alliance (IPDA) & Lean Construction Institute (LCI)

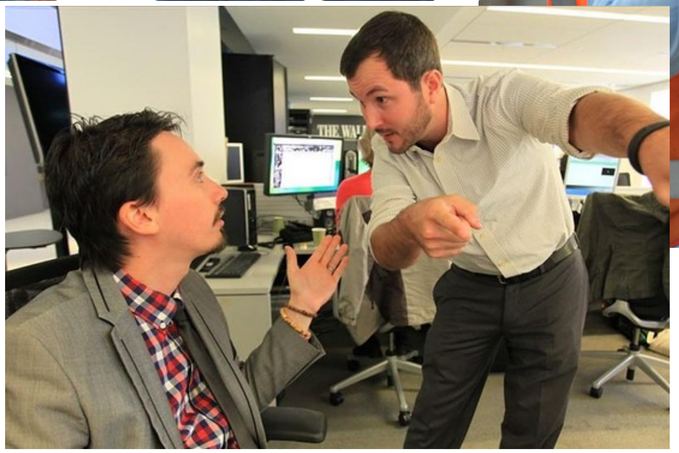
University of Minnesota

IPDA

Lean Construction Institute
Transforming Design and Construction



it looks different!




PIT
LEGEND
PURPOSE OF VALIDATION
TO BE ABLE TO STATE WITH CONFIDENCE "WE CAN BUILD THIS BUILDING, THAT DOES THESE THINGS, FOR THIS MUCH MONEY, IN THIS MUCH TIME
WHAT INFORMATION DO WE NEED TO MAKE THAT STATEMENT?


agenda
AECOM


- JIM
OWNERS
- JULIA
- CLAIRE
- DAVID
- CORY / SUE
- BRYAN / PETER

Why this is Good for Us

Increased productivity / Less time in documentation
Fewer RFI’s and conflicts
More informed decision making
Better project cost control / Improved budget management
Minimization of Waste
Better use of resources
Greater understanding and control over the construction process and long term project outcomes

leadership + innovation

Only one other Ontario IPD project
and one under way…this is
innovative, we will be seen as
leaders within the industry both for
process and campus approach …
which enhances collaboration
between services

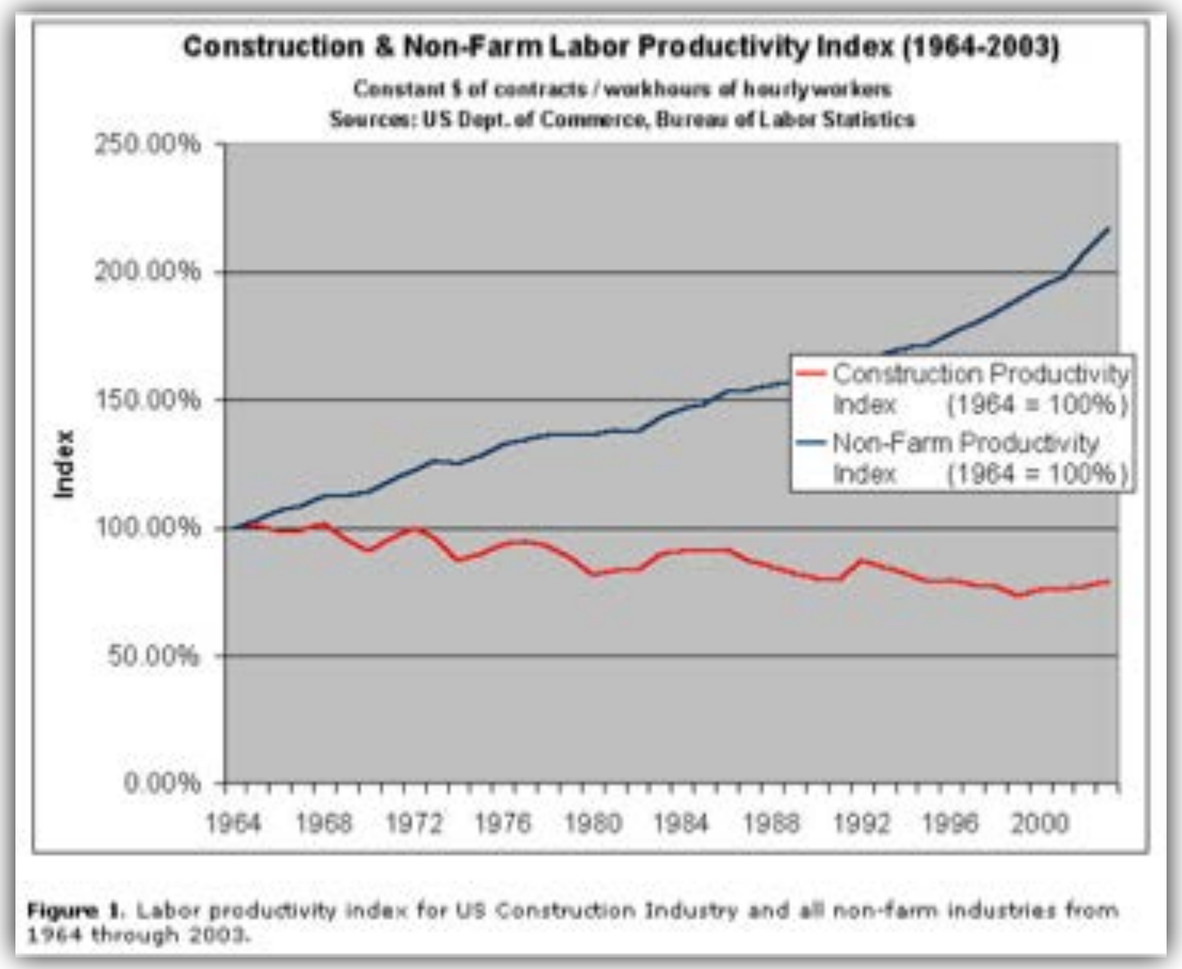


Figure 1. Labor productivity index for US Construction Industry and all non-farm industries from 1964 through 2003.

2004

US Dept. of Commerce,
Bureau of Labor Statistics

CHANDOS

next steps

Complete Validation

Approval to Proceed:

Police Board | May 2017

City Council | June 2017

County Council | June 2017

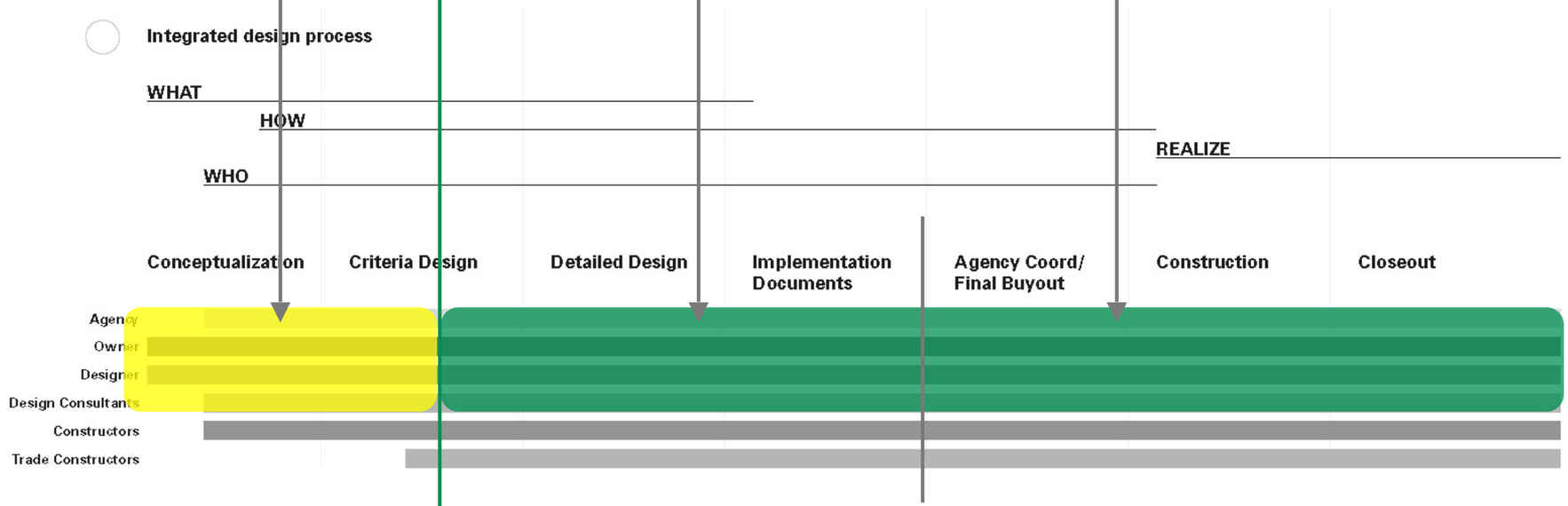
May / June

Approval to Proceed

validation

design and implementation documents

construction



Fall 2017

Diagrams from AIA/AIACC's 2007 "Integrated Project Delivery: A Guide