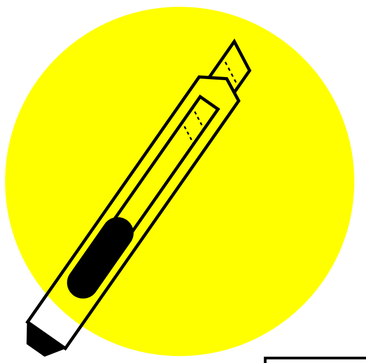
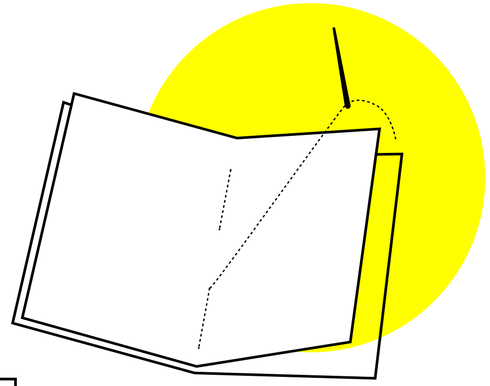
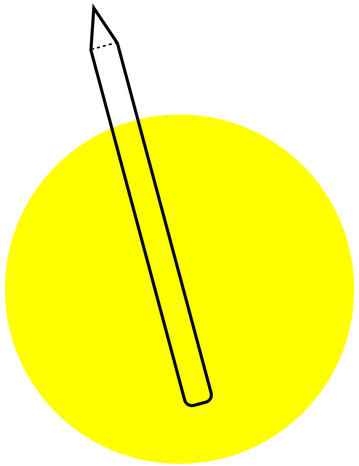
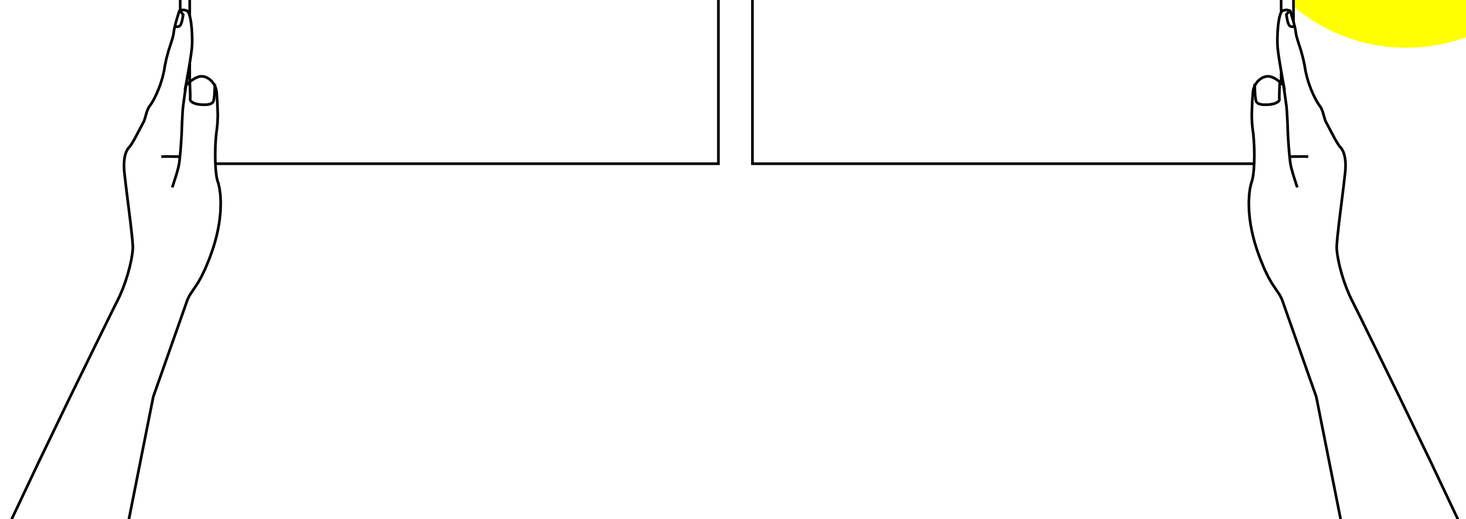


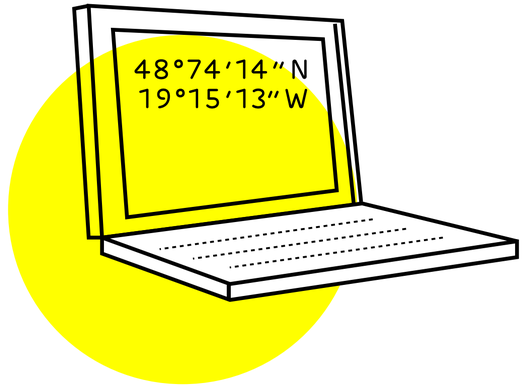




GRAPHIC DESIGN PRINCIPLES

POSTER

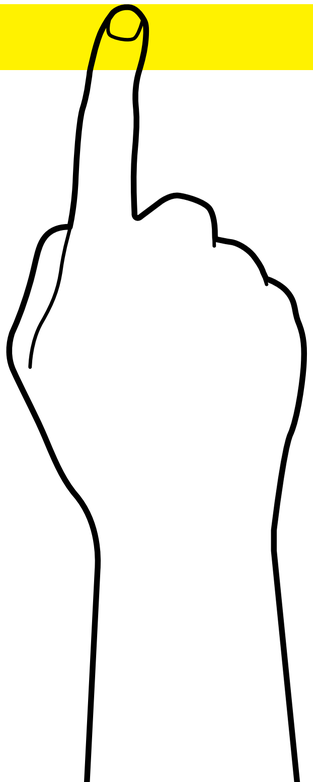




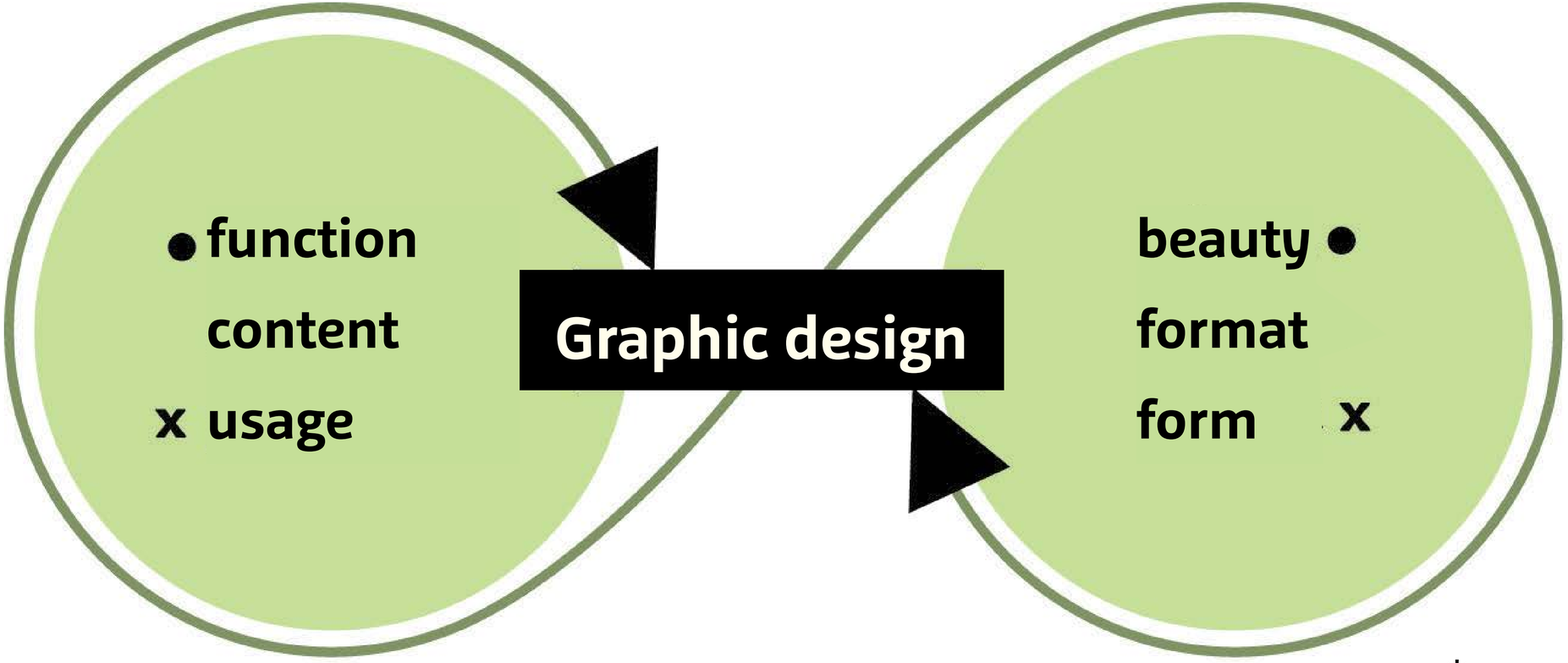
01 Definition of graphic design
02 Graphic design principles
03 Typography
04 Process of creating a poster
05 Case study

Graphic design

DEFINITON



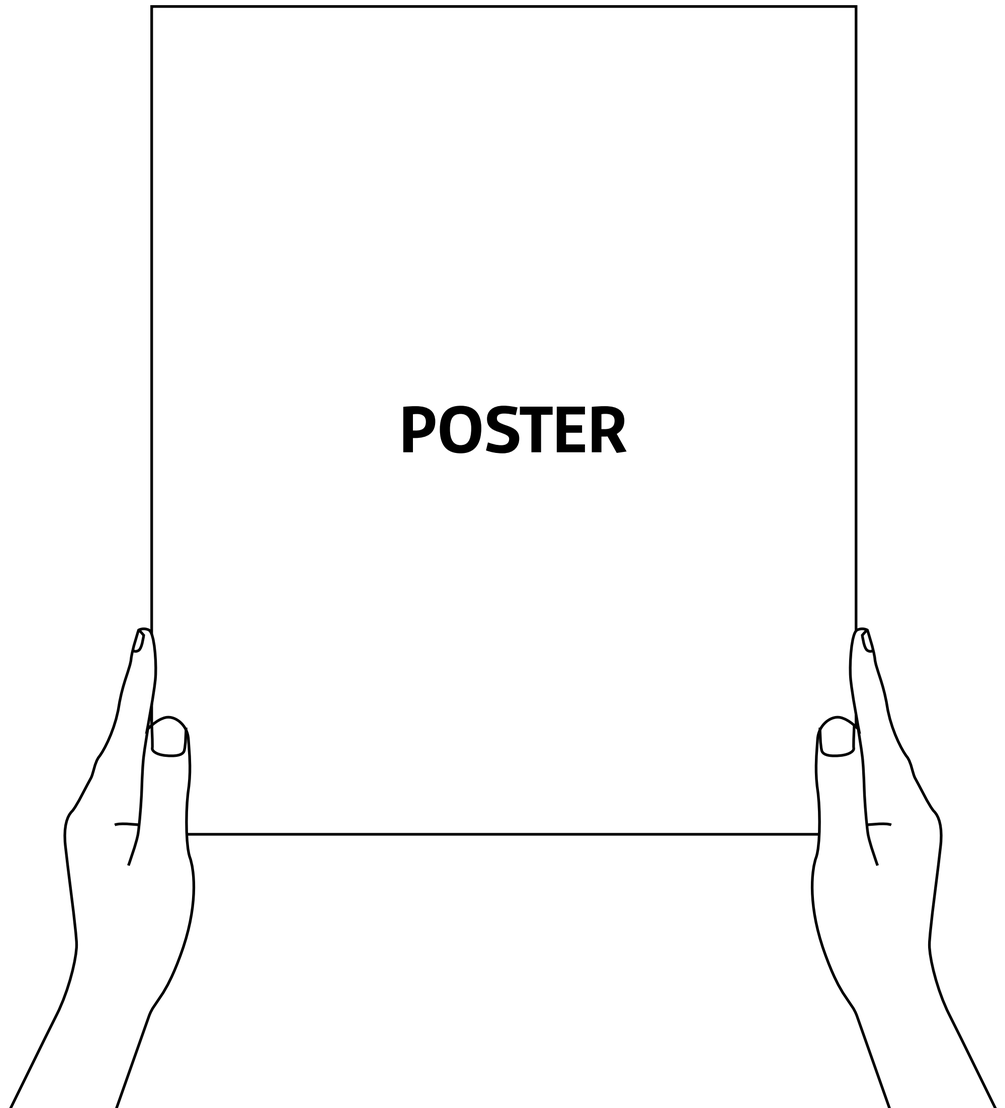
Graphic design
Definition



*

* Ladislav SUTNAR

Poster
Definition

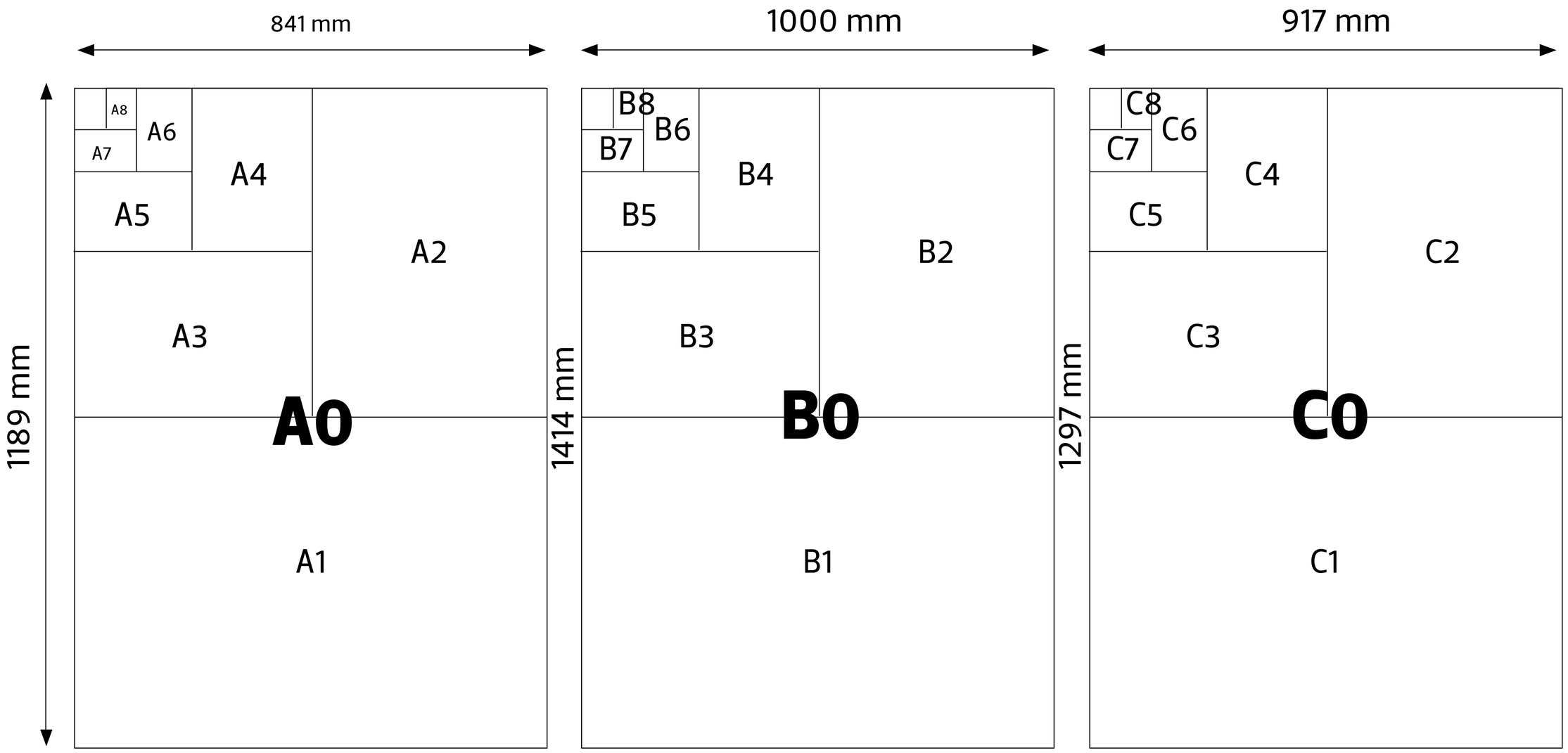


Large printed format consisting of text, image, photography

On public places

To inform

Format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A0, A1	Science posters and technichal drawings
A1, A2	Working boards (at meetings)
A2, A3	Diagrams, drawings and big boards
A4	Magazines, letter, leaflets,...
A5	Notebooks, calendars
A6	Postcards
B5, A5, B6, A6	Books
C4, C5, C6	Letter envelopes
B4, A3	Newspaper
B8, A8	Playing cards

Science posters
Case studies

Real-time Analysis of NetFlow Data for Generating Network Traffic Statistics using Apache Spark

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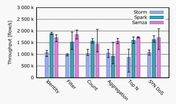
E-mail: {cermak, jirsik, lastovicka}@ics.muni.cz

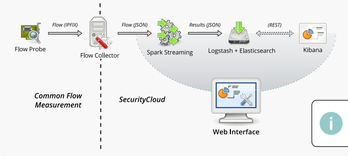
Abstract — We present a framework for the realtime generation of network traffic statistics on Apache Spark Streaming, a modern distributed stream processing system. Our previous results [1] showed that stream processing systems provide enough throughput to process a large volume of NetFlow data and hence they are suitable for network traffic monitoring. This demo describes the integration of Apache Spark Streaming into a current network monitoring architecture. We prove that it is possible to implement the same basic methods for NetFlow data analysis in the stream processing framework as in the traditional ones. Moreover, our stream processing implementation discovers new information which is not available when using traditional network monitoring approaches.

Systems Performance Benchmark — Four Nodes (32 vCPUs)



- Samza and Spark have a high-enough flow throughput and can be used for the analysis of data from multiple networks at the same time.
- Apache Spark system has been chosen as it offers an easy management and a high versatility in terms of the running environment and proprietary processing methods (e.g., sliding window).

Framework Architecture



The demonstration cluster consists of 7 virtual machines, one is dedicated to IPFIXcol, 5 to Spark and one to the Kibana and Web server. The following configuration is the same for all machines:

- (4 vCPUs) Intel(R) Xeon(R) CPU E5-2680 0 @ 2.70GHz,
- 8GB 1600MMHz DIMM DRAM EDO,
- 85GB SCSI Disk with 53c1030 PCI-X Fusion-MPT Dual Ultra320 SCSI,
- 10 Gbit/s network connection, 1 Gbit/s virtual NICs.

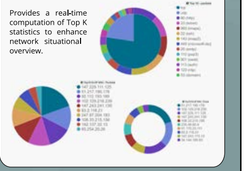
IPFIXcol is a flexible IPFIX flow data collector designed to be easily extensible by plugins. In our demonstration, we use only part of its wide functionality – data acquisition from multiple network probes and their transformation into a JSON data stream.

Statistics Volatility of Network Traffic Data

- Stream processing provides more accurate statistics about network traffic.
- Statistics generated by the stream processing showed increased volatility in results compared to traditional flow data processing approaches.
- Allows to observe short, but strong bursts of the network traffic that were lost due to the aggregation used in traditional batch approaches.

Real-time TOP K Statistics

Provides a real-time computation of Top K statistics to enhance network situational overview.



SecurityCloud

References

[1] M. Čermák, D. Tovarňák, M. Laštovička, and P. Čeleda. *A Performance Benchmark for NetFlow Data Analysis on Distributed Stream Processing Systems*. In Proceedings of NOMS, 2016.

Acknowledgements

TA ČR This research was supported by the Technology Agency of the Czech Republic under No. **TA04010062** *Technology for processing and analysis of network data in big data concept.*

Verification of Programs with Inputs

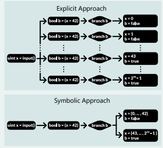
FACULTY OF INFORMATICS Masaryk University
Henrich Lauko, Vladimír Štill, Petr Ročkai, Jan Mrázek and Jiří Barnat

DIVINE

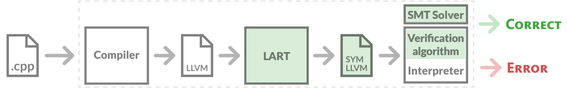
DIVINE is a tool for verification of parallel C++ programs. By using the LLVM compilation framework with the Clang compiler and the libc++ library it provides support for most of the standard C++ library and all the C++ language features. DIVINE is rather efficient when dealing with programs without inputs (for example test cases). A big downside of the current version of DIVINE is that for programs with inputs, this input has to be simulated by nondeterministic choice which is very inefficient. Therefore we present an approach for symbolic representation of inputs in DIVINE.

Symbolic States

Consider a simple program with 32 bit input variable **x** and a branch on the value of this variable. In the current DIVINE, this program gives rise to 2^{32} possible memory configurations. In symbolic version, possible values of variables **x** and **b** are represented symbolically using bitvector formulae, therefore, there are only two possible configurations at the end of the program.



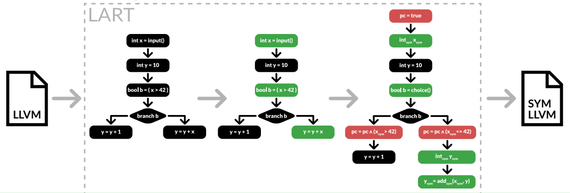
Proposed Approach



To take advantage of symbolic representation of states, we transform the LLVM bitcode in such a way that it represents variables which can contain values dependent on inputs symbolically. This transformation is performed by LART and is resented in detail later. Apart from that, the verification algorithm is modified to handle symbolic states with the help of an SMT solver.

Our approach aims for minimizing changes to the LLVM interpreter that is used to execute instructions in DIVINE. The reason is that the interpreter is complex and performance tuned and therefore it is not desirable to make it even more complex by adding symbolic data manipulation into it. Instead, symbolic data are to be handled by the program itself. To encode symbolic manipulations into the program we transform the LLVM bitcode produced by the compiler and create symbolic LLVM from it. This not only minimizes changes to the interpreter, but the transformation can also be used for different representation of symbolic data quite easily. The transformation is handled by LART – LLVM Abstraction & Refinement Tool. Furthermore, DIVINE's verification algorithm has to be modified. It has to check if symbolic states are valid (nonempty), that is if they can represent at least one concrete state. It also has to handle comparison of symbolic states. For both of these tasks, DIVINE has to extract SMT formulae from the program state and use SMT solver.

Details of Program Transformation



LLVM bitcode is generated from C++ source code. | Dependence graph of LLVM instructions is created from the control flow of a program. | Instructions dependent on the input are computed. | Dependent instructions are substituted with symbolic calls, path condition manipulations are added. | A program simulating original instructions in a symbolic manner.

LART takes the LLVM bitcode of the program and libraries produced by the compiler and transforms it into a bitcode which manipulates data symbolically. In this modified program, any variable which can depend on an input value is represented symbolically using bitvector formulae. Bitvector formulae describe integers of fixed bit width with overflow and bitwise operations, and therefore are well suited for exact representation of computer integers. All the manipulations with such variables have to be transformed to their symbolic versions which modify the formulae accordingly. Furthermore, any branch which depends on an input value has to put constraints on the possible values of symbolic variables (this constraint is given in the form of a path condition formula).

ParaDiSe Parallel & Distributed Systems Laboratory

EACirc

MASARYK UNIVERSITY
Martin Ukrop, Petr Švenda, Marek Sýs, Václav Matyáš et alii

FOR FOR SECURITY GOOD PRACTICE IN CRYPTOGRAPHY

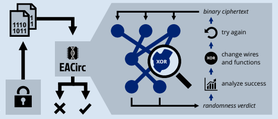
Using genetics to improve encryption

Problem statement

Randomness testing

The ciphertext produced by encryption should be completely indistinguishable from random data. But how to compare?

EACirc is a framework for designing a distinguisher – a simple program that decides whether generated ciphertext looks random enough.



Iterative design

The designed distinguisher is in the form of a gate circuit (layers of simple interconnected functions).

It processes binary data and outputs a randomness verdict. It is improved iteratively, using ideas from evolutionary algorithms (see the next section for details).

EACirc workflow

1. Forming a population

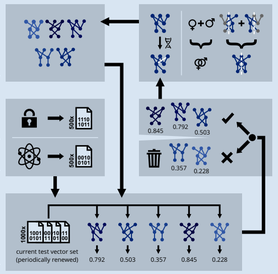
A set of currently considered partial solutions (gate circuits distinguishing cipher data from random data). The initial population is created randomly.

2. Test vector generation

Testing data for learning is sampled from both sources. That is, non-random data from the inspected cipher and random data from a truly random source.

3. Fitness assessment

Each circuit from the population is evaluated on all test vectors from the current set. Based on the outputs, it is assigned a fitness value from the interval [0,1].



5. Mutation & crossover

To form new individuals, we use mutation and crossover. Mutation makes small random changes in nodes and connectors. Crossover creates an offspring by combining different parts from two circuits taken from the population.

The new population now enters the evolution cycle again, gradually improving its fitness.

4. Survival of the fittest

Unfit individuals are discarded, better ones survive to the next generation. The higher the fitness, the bigger is the chance of survival.

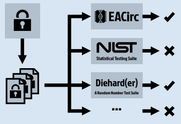
The evolution works as a heuristics looking for better individuals – gate circuits distinguishing random and non-random data with higher probability than random guessing.

Comparison to existing tools

EACirc vs statistical testing

The standard way to assess randomness is to use batteries of statistical tests such as *NIST STS*, *Diehander* or *TestU01*. We run them along with EACirc and compare the results.

To have a fine-grained comparison, we have analyzed 77 different functions (*eStream*, *SHA-3* and *CAESAR* candidates). For 2-round *Hermes* and 1-round *Fubuki* we confidently surpass *NIST STS*.



Further information

Interested in EACirc? See the papers referenced below or ask directly at the lab (CRoCS @ FI MU).

[1] Švenda, Ukrop, Matyáš. *Determining cryptographic distinguishers for eStream and SHA-3 candidate functions with evolutionary circuits*. In: E-Business and Telecommunications. Vol. 456 (SECRYPT 2013). Springer Berlin Heidelberg, 2014.

[2] Kubíček, Novotný, Švenda, Ukrop. *New results on reduced-round Tiny Encryption Algorithm using genetic programming*. IEEE Infocommunications. Vol. 8, iss. 1. 2016.

CROCS Centre for Research on Cryptography and Security

This work was supported by the Czech Science Foundation grant GAP202/11/0422.

CERIT Scientific Cloud
Looking for Synergies in Scientific Computing

David Antoš, Aleš Klenek, Ivana Klenková, Luděk Matyska
Institute of Comp. Science, Masaryk University, Brno

Mission

CERIT Scientific Cloud centre, the successor of Supercomputing Centre Brno at Masaryk University, is a national centre providing flexible computational and storage capacities. Provision of these resources is complemented with extensive research activities, carried both in cooperation with the user communities and in the e-Infrastructure area itself.

History

Supercomputing Centre Brno (SCB) is a part of Institute of Comp. Science, Masaryk University. SCB was founded in 1994 as one of big supercomputing centres in the Czech Republic of that time. Similar cooperating centres were founded by other universities (Prague, Pilsen, Brno, Ostrava).

SCB has been working with Faculty of Informatics, Masaryk University, for a long time. The cooperation is both personal and factual, formally expressed, e.g., in a common research intent "Highly parallel and distributed computation systems".

Funding

Transformation of SCB into CERIT-SC will be supported by a project of the 3rd axis of the RD&I Operational Programme. The project will be realised from May 2011 to October 2013. Its overall budget is 5 MEur.

CERIT-SC is included in the **Roadmap for Large Research, Development and Innovation Infrastructures in the Czech Republic**.

Scientific director Prof. RNDr. Luděk Matyska, CSc.
Project manager Roman Čermák, M.Sc., MBA

http://www.cerit-sc.cz

Goals

CERIT-SC will **provide highly flexible computation environment** and primary **data storage capacities** for the national e-Infrastructure.

Research and development in CERIT-SC is focused on

- work with the users on tools and means for **efficient use** of the e-infrastructure by applications
- cooperation with the users in development, deployment, and operation of
  - new and modified systems and programs running in flexible computation environment
  - systems for storing, archiving, and retrieval of data
  - tools and protocols for data storage facilities interconnection, …

The research work will evolve in a **doctoral school** with student participation from both IT and application areas.

CERIT-SC will become an **important node of national e-Infrastructure**, including integration into the European Grid Infrastrucute. This will be achieved by tight cooperation with CESNET on development and adoption of appropriate standards.

Cooperation with Users

Deluge of experimental data is expected in near future. Many existing computational methods will **break or stop scaling**, new **developments** will be required.

User communities will come up with **interesting problems**. CERIT-SC will provide the necessary **IT expertise**. We expect formation of **joint teams**

- consisting of experts from both sides,
- addressing specific research areas – both ad-hoc and long term work,
- involving students (undergraduate and Ph.D.).

This work will result in **common publications**. Targeted projects are also expected.

Formal **agreement on future collaboration** (LoI):

- R&DI: AdMaS, BIOCEV, CEITEC, CzechGlobe, RECAMO
- cooperating institutions: IIBA, MZK, Loschmidt Labs., RECETOX
- ESFRI projects (in negotiation): LINDAT-CLARIN, Euro-Biolmaging

Flexible Resources

Provision of the resources will range from traditional **batch queues**, through **interactive access** upto the **cloud** paradigm. The resources will be provided free of charge.

Prioritization of the users will be based on their **scientific results**; resulting resource allocation will be achieved by technical means, combining advanced resource scheduling, virtualization, and the cloud paradigm; no complex administrative process will be required.

By careful ballancing the scheduling strategies, successful users will get better share while new users, students etc. will not be prevented from using the resources.

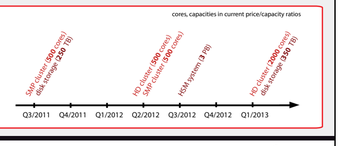
CERIT-SC computational resources are intended to serve **unexpected and unplanned requirements** of the users primarily.

Data resources will serve to **store and share data** semipermanently and permanently. They will be tightly integrated with the computational resources. The target community are the **end-users** again.

Equipment and Purchase Schedule

The project will purchase the following resources:

- SMP – Symmetric MultiProcessing clusters, with more than 64 cores and 128 GB memory per node (1000 cores total)
- HD – High Density clusters with higher number of nodes with 8-16 cores and 16-32 GB memory (2500 cores total)
- HSM Hierarchical Storage Management (3 PB)
- disk storage (600 TB)
- development tools and application software



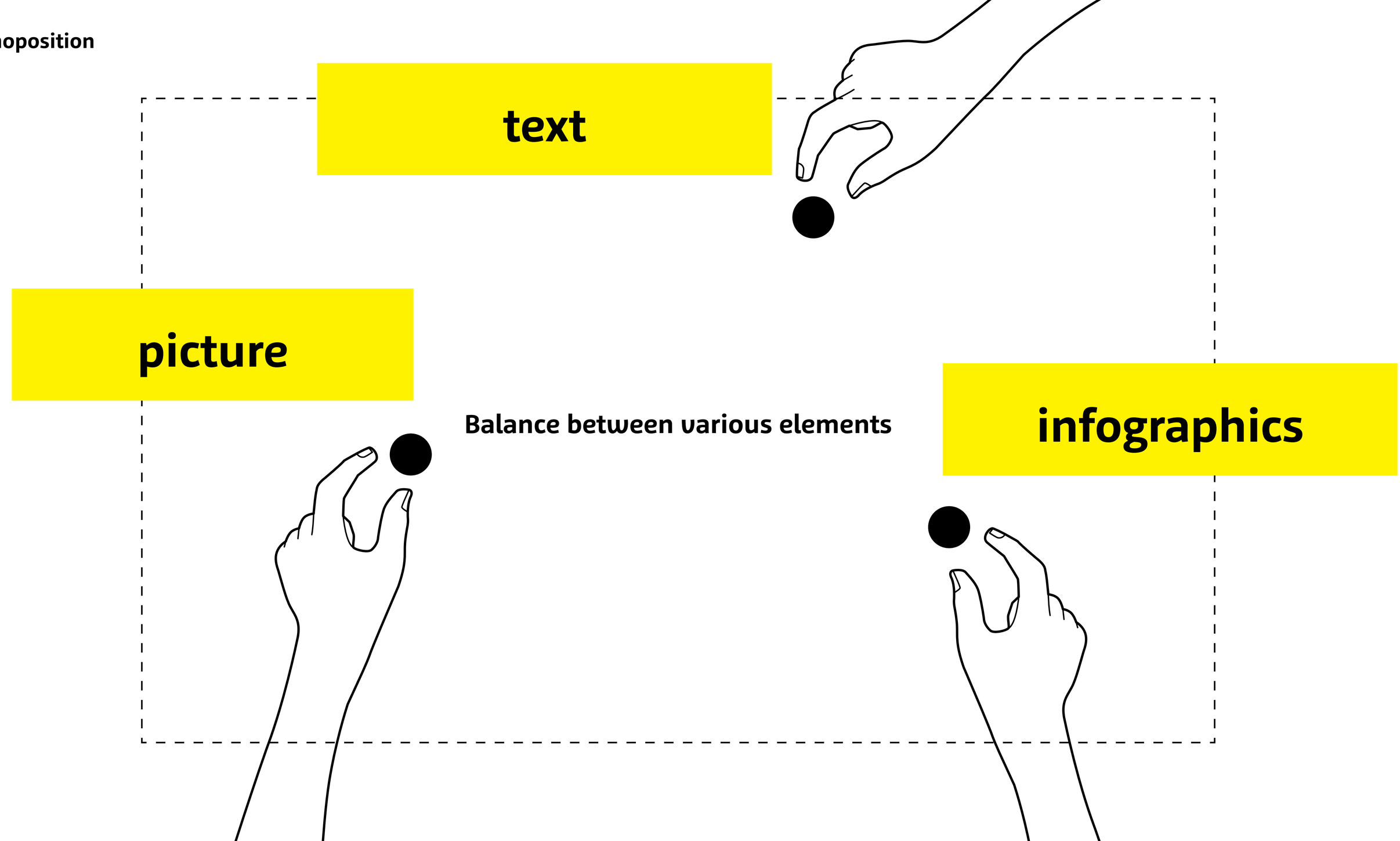
CERIT SCIENTIFIC CLOUD

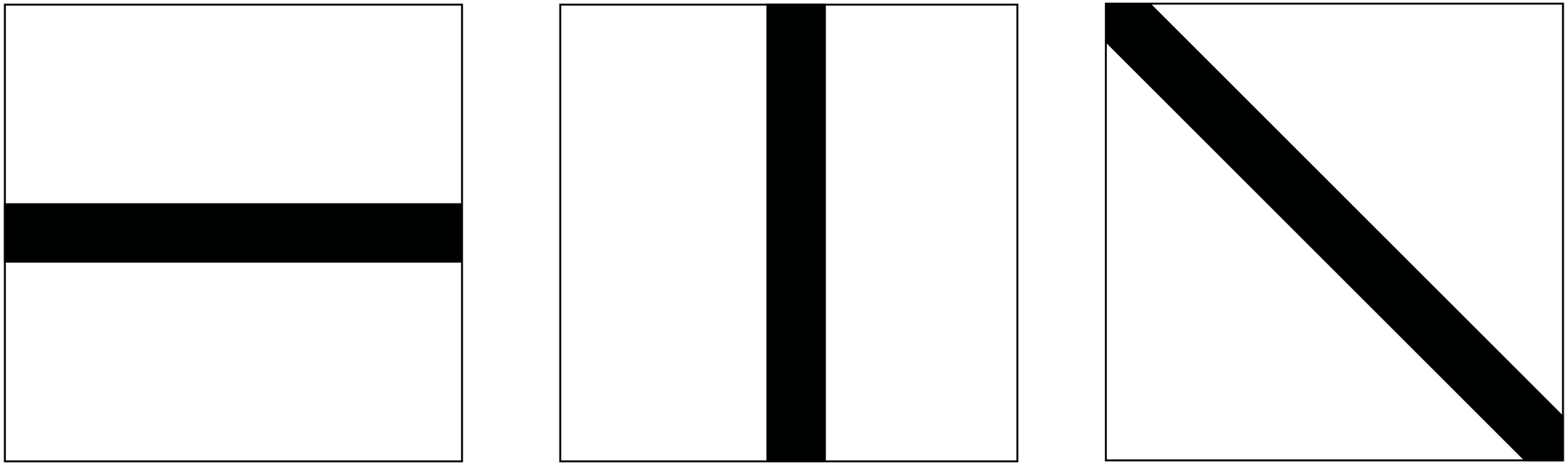
This poster presentation is partially supported by project "Vzdělávání akademických pracovníků v oblasti eInfrastruktur"
(CZ.1.07/2.3.00/09.0074)"

INVESTMENTS IN EDUCATION DEVELOPMENT

Composition

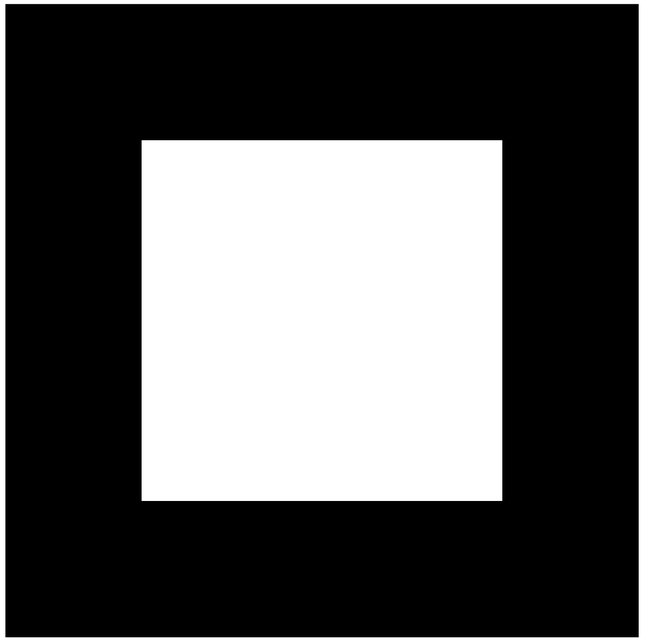
Comoposition

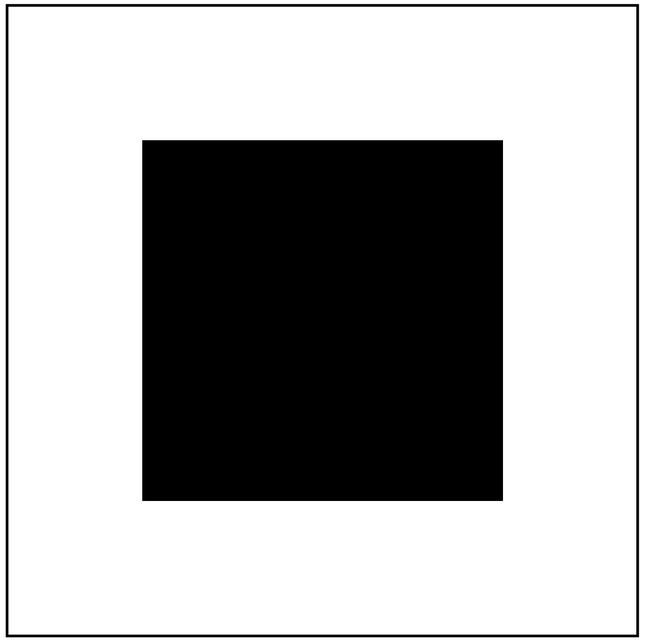




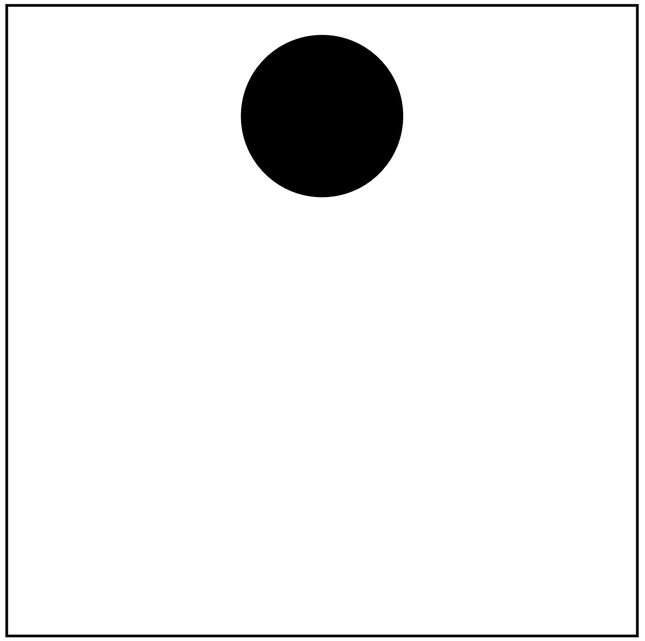
Vertical objects appear heavier than horizontal objects.
A diagonal orientation carries more visual weight than
a horizontal or vertical one.

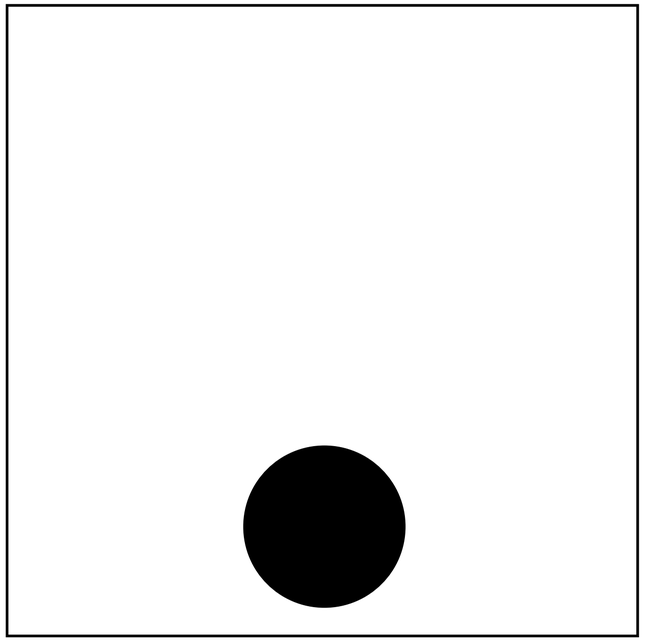
Comoposition





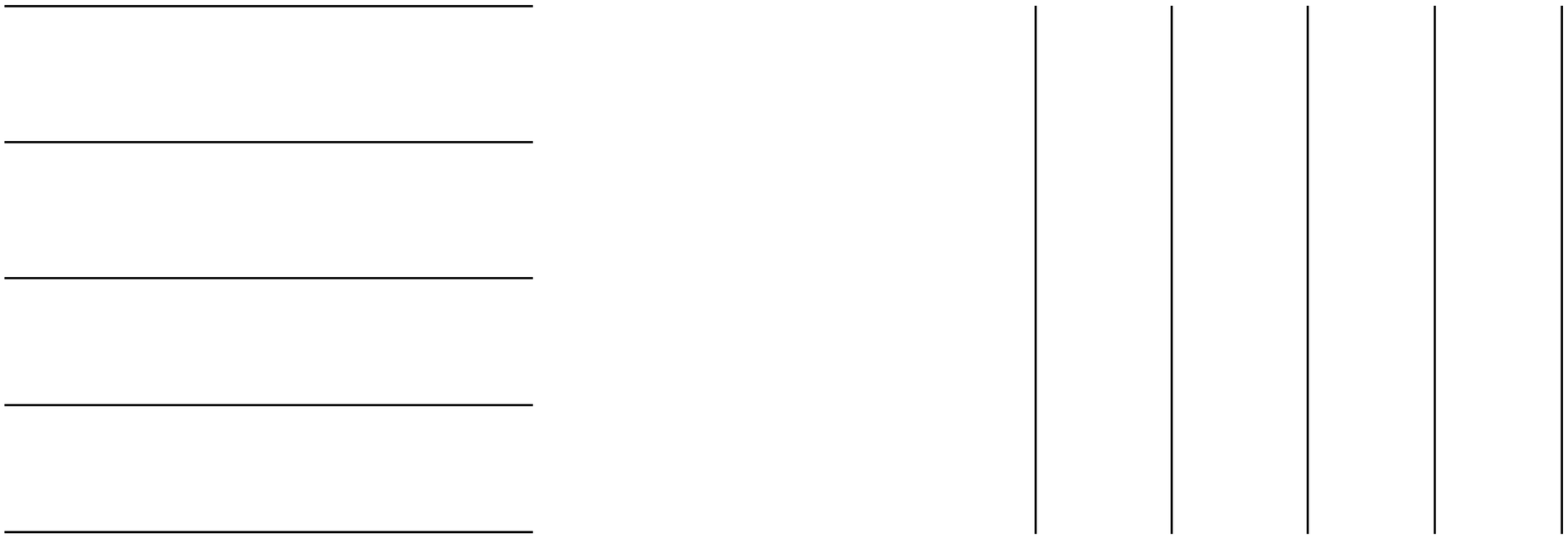
White square on the black background appears bigger than the black square on white colour.



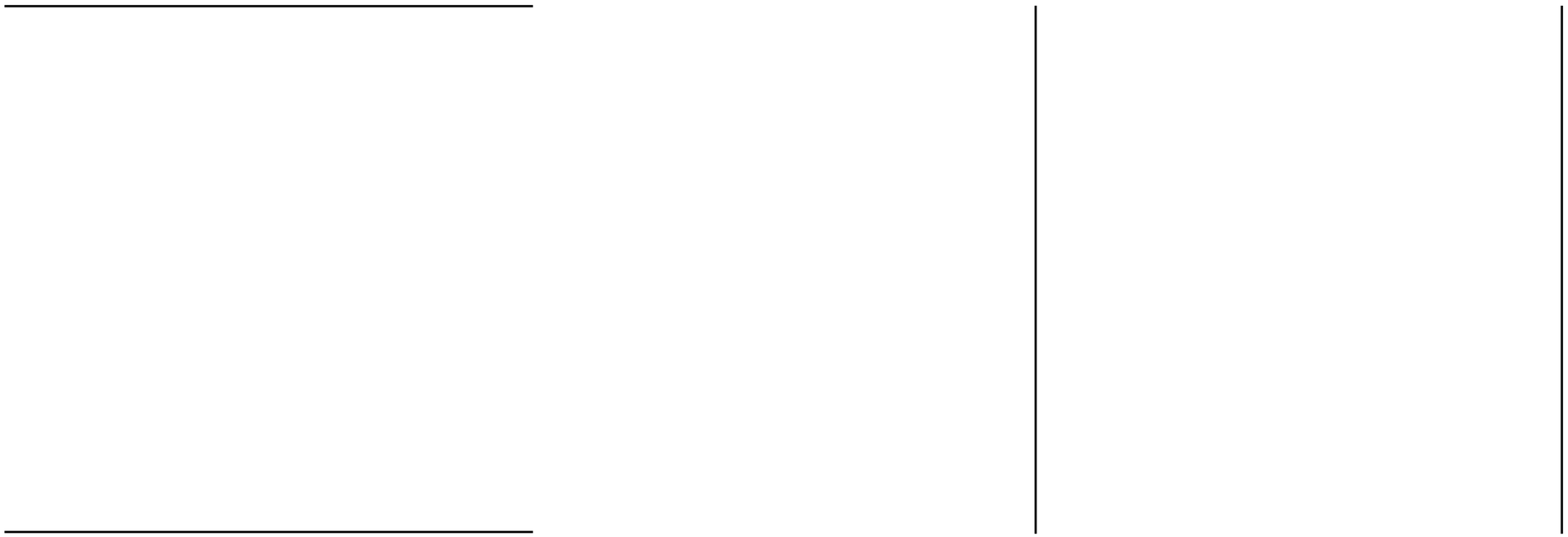


The visual weight of an object increases in proportion to its distance from the center (or dominant area) of the composition.

Comoposition



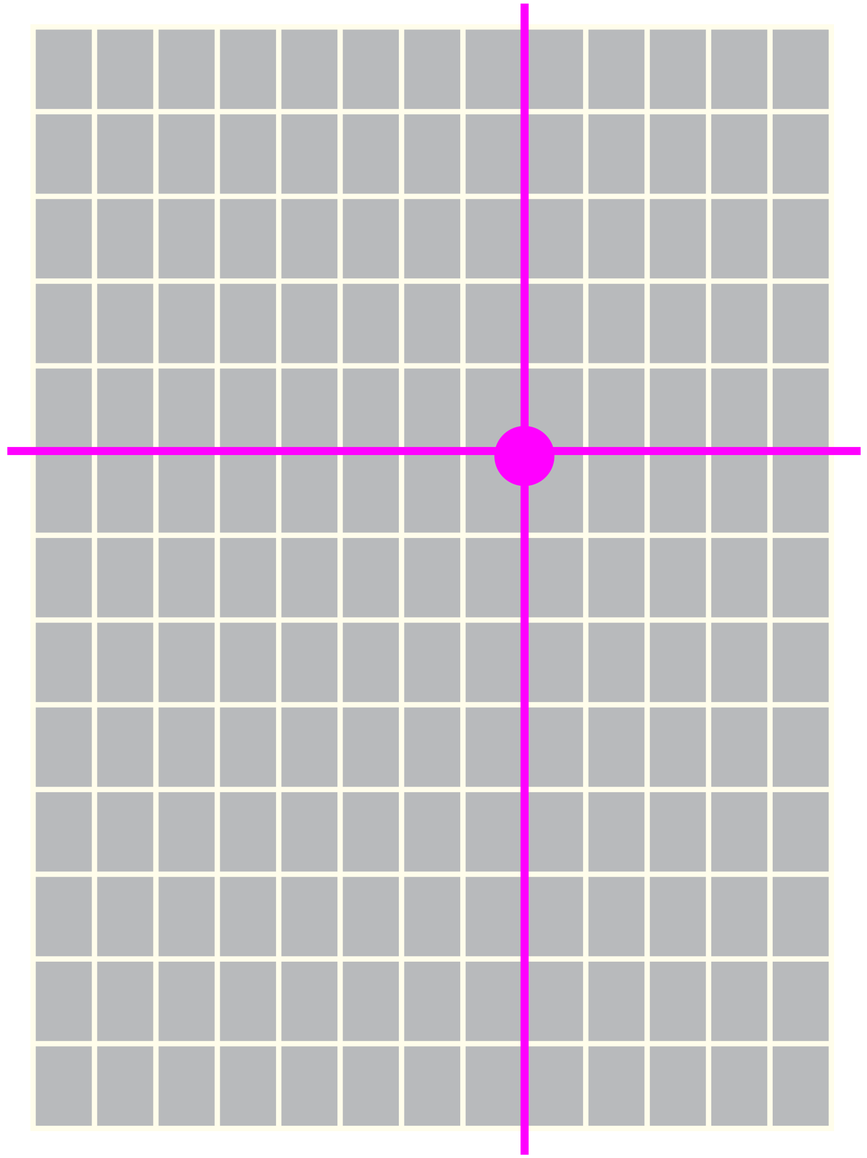
Horizontal lines makes shape higher, vertical lines makes it wider.



Border horizontal lines makes shape wider,
vertical lines makes it higher.

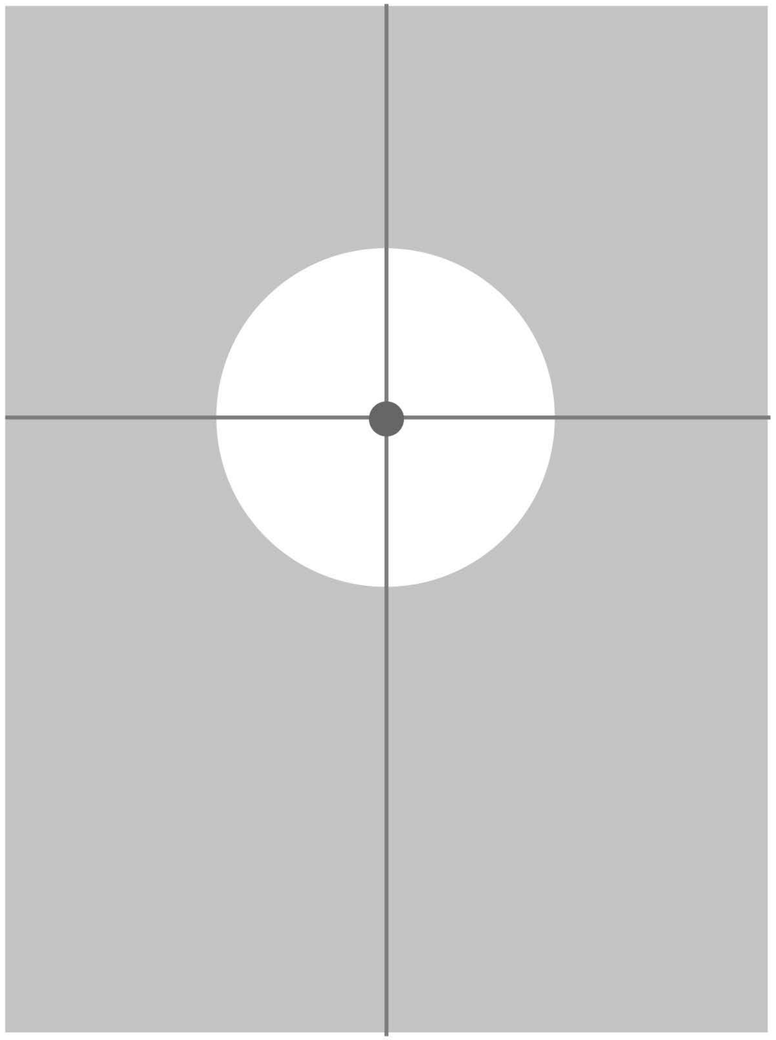
Comoposition

The Golden Section or Ratio is is a ratio or proportion defined by the number Phi (= 1.618033988749895...)

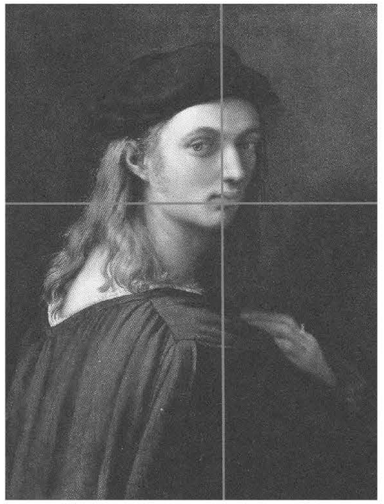


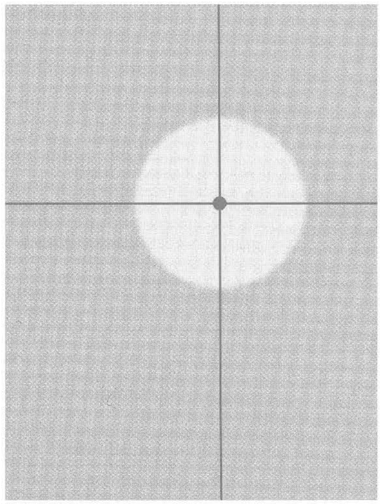
Jan Tschichold

Comoposition



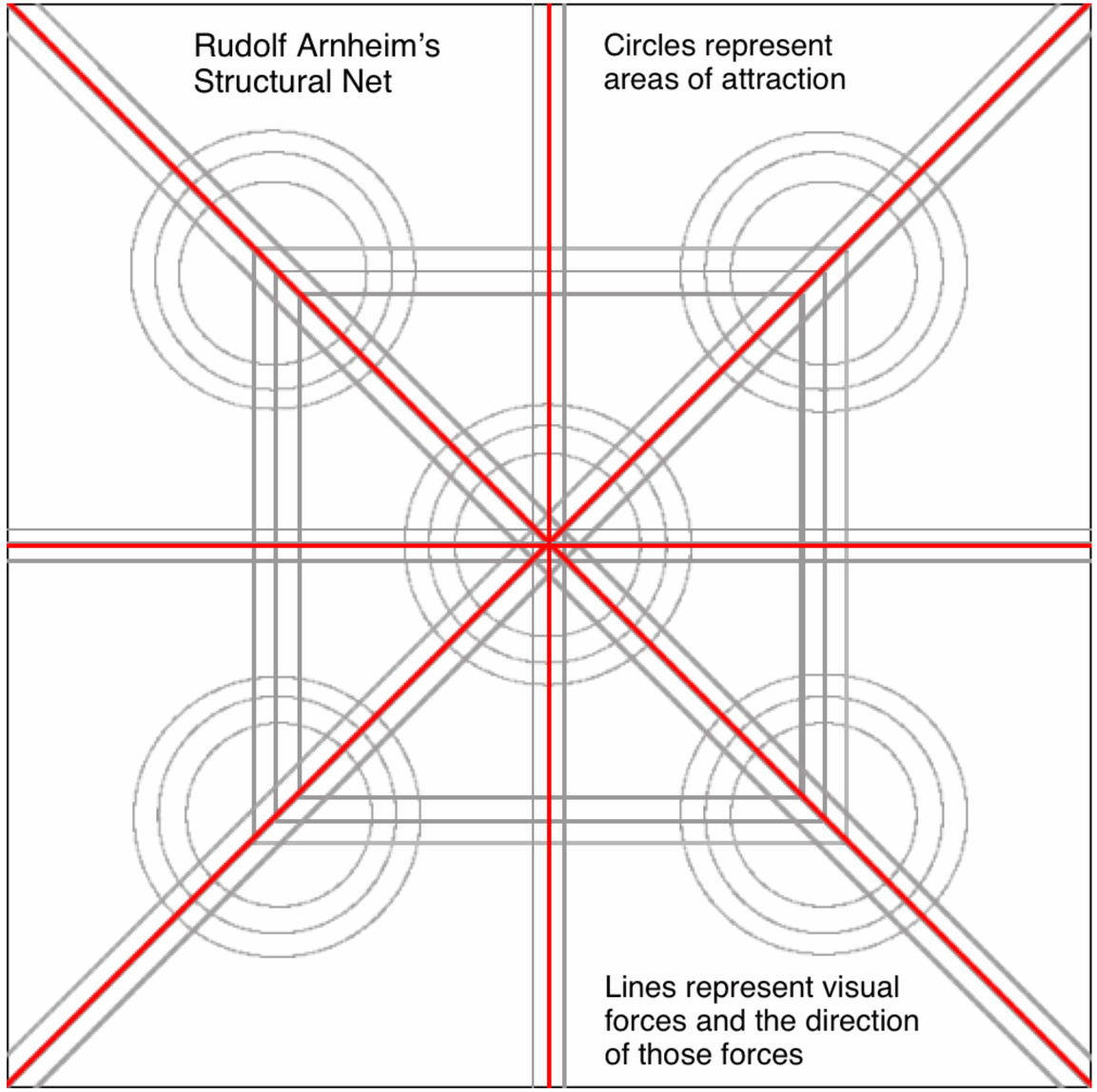
Portrait of Bindo Altoviti (1514), Raphael – mouth and eyes are the key points places in optical centre



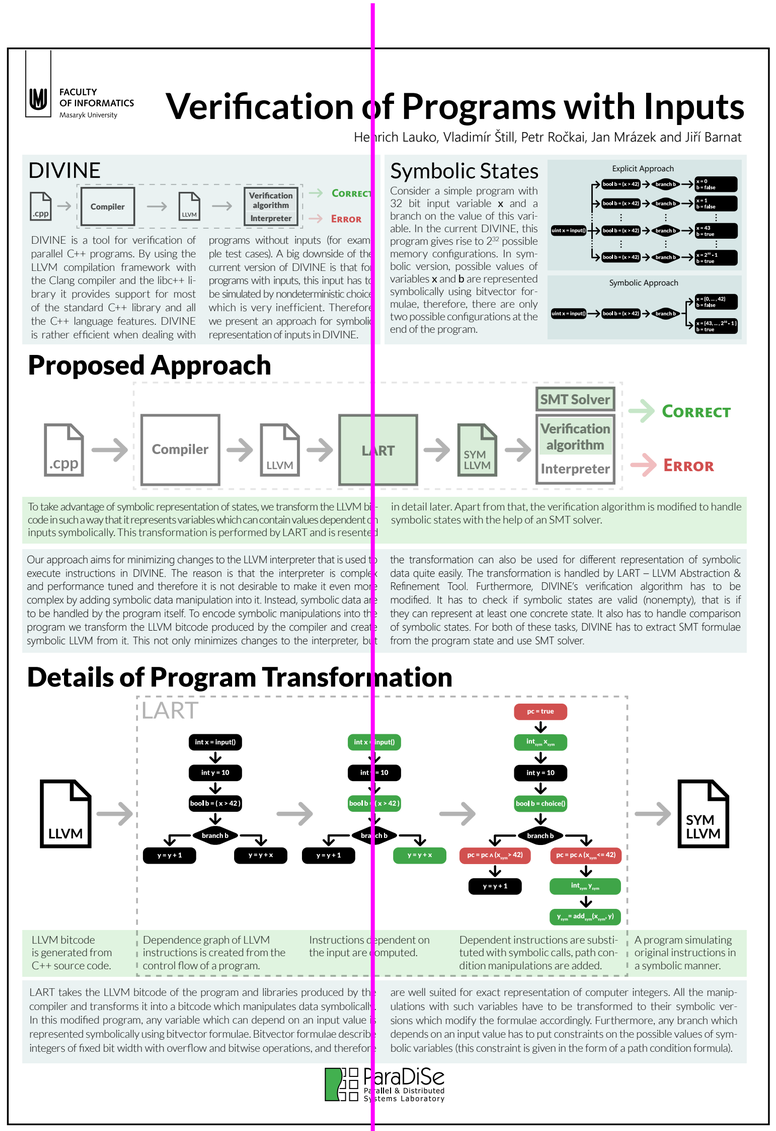


Comoposition
Optical centre

Rudolf Arnheim's diagram



Case studies
Centered layout



FACULTY OF INFORMATICS
Masaryk University

Verification of Programs with Inputs

Henrich Lauko, Vladimír Štill, Petr Ročkai, Jan Mrázek and Jiří Barnat

DIVINE

.cpp → Compiler → LLVM → Verification algorithm / Interpreter → CORRECT / ERROR

DIVINE is a tool for verification of parallel C++ programs. By using the LLVM compilation framework with the Clang compiler and the libc++ library it provides support for most of the standard C++ library and all the C++ language features. DIVINE is rather efficient when dealing with programs without inputs (for example test cases). A big downside of the current version of DIVINE is that for programs with inputs, this input has to be simulated by nondeterministic choice, which is very inefficient. Therefore, we present an approach for symbolic representation of inputs in DIVINE.

Symbolic States

Consider a simple program with 32 bit input variable **x** and a branch on the value of this variable. In the current DIVINE, this program gives rise to 2^{32} possible memory configurations. In symbolic version, possible values of variables **x** and **b** are represented symbolically using bitvector formulae, therefore, there are only two possible configurations at the end of the program.

Explicit Approach

int x = input() → bool b = (x = 42) → branch b → x = 0, b = false / x = 1, b = false / … / x = 43, b = true / … / x = 2^{32} − 1, b = true

Symbolic Approach

int x = input() → bool b = (x = 42) → branch b → x = {0, …, 42}, b = false / x = {43, …, 2^{32} − 1}, b = true

Proposed Approach

.cpp → Compiler → LLVM → LART → SYM LLVM → SMT Solver / Verification algorithm / Interpreter → CORRECT / ERROR

To take advantage of symbolic representation of states, we transform the LLVM bitcode in such a way that it represents variables which can contain values dependent on inputs symbolically. This transformation is performed by LART and is resented in detail later. Apart from that, the verification algorithm is modified to handle symbolic states with the help of an SMT solver.

Our approach aims for minimizing changes to the LLVM interpreter that is used to execute instructions in DIVINE. The reason is that the interpreter is complex and performance tuned and therefore it is not desirable to make it even more complex by adding symbolic data manipulation into it. Instead, symbolic data are to be handled by the program itself. To encode symbolic manipulations into the program we transform the LLVM bitcode produced by the compiler and create symbolic LLVM from it. This not only minimizes changes to the interpreter, but the transformation can also be used for different representation of symbolic data quite easily. The transformation is handled by LART – LLVM Abstraction & Refinement Tool. Furthermore, DIVINE's verification algorithm has to be modified. It has to check if symbolic states are valid (nonempty), that is if they can represent at least one concrete state. It also has to handle comparison of symbolic states. For both of these tasks, DIVINE has to extract SMT formulae from the program state and use SMT solver.

Details of Program Transformation

LLVM → LART → SYM LLVM

LART: int x = input() → int y = 10 → bool b = (x > 42) → branch b → y = y + 1 / y = y + x

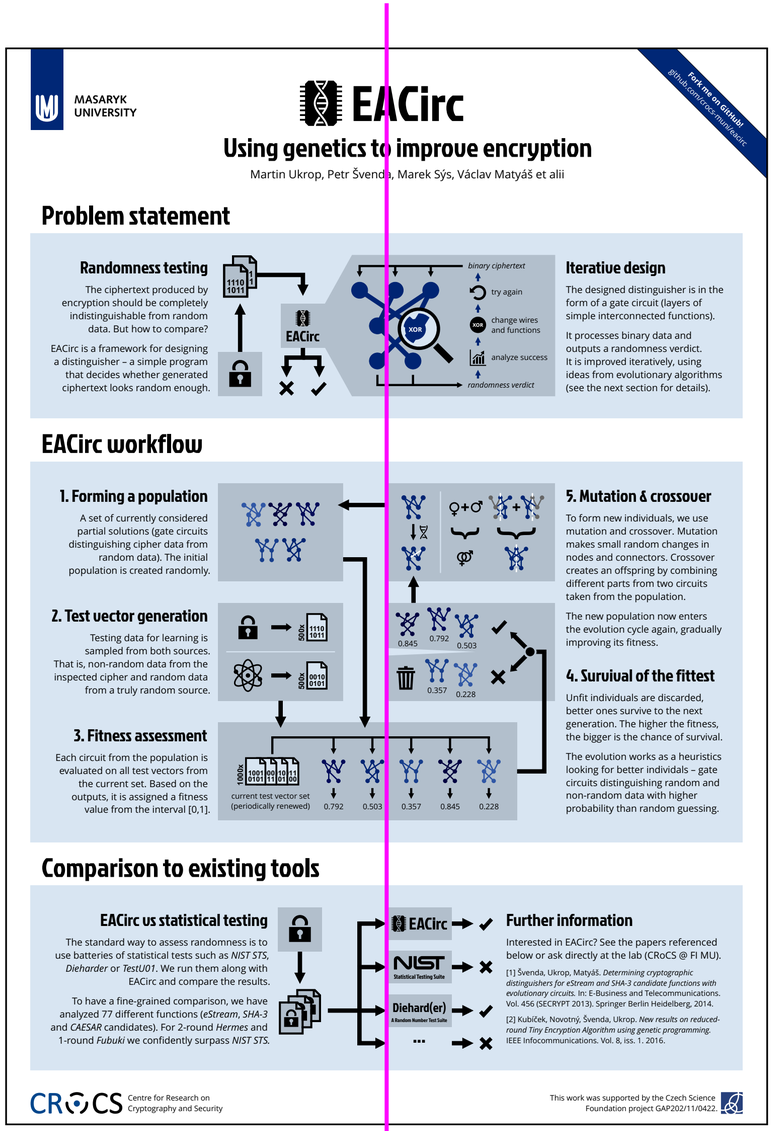
int x = input() → int y = 10 → bool b = (x > 42) → branch b → y = y + 1 / y = y + x

pc = true → int_{sym} x_{sym} → int y = 10 → bool b = choice() → branch b → pc = pc ∧ (x_{sym} > 42) → y = y + 1 / pc = pc ∧ (x_{sym} <= 42) → int_{sym} y_{sym} → y_{sym} = add_{sym}(x_{sym}, y)

LLVM bitcode is generated from C++ source code. | Dependence graph of LLVM instructions is created from the control flow of a program. | Instructions dependent on the input are computed. | Dependent instructions are substituted with symbolic calls, path condition manipulations are added. | A program simulating original instructions in a symbolic manner.

LART takes the LLVM bitcode of the program and libraries produced by the compiler and transforms it into a bitcode which manipulates data symbolically. In this modified program, any variable which can depend on an input value is represented symbolically using bitvector formulae. Bitvector formulae describe integers of fixed bit width with overflow and bitwise operations, and therefore are well suited for exact representation of computer integers. All the manipulations with such variables have to be transformed to their symbolic versions which modify the formulae accordingly. Furthermore, any branch which depends on an input value has to put constraints on the possible values of symbolic variables (this constraint is given in the form of a path condition formula).

ParaDiSe
Parallel & Distributed Systems Laboratory



MASARYK UNIVERSITY

EACirc

Fork me on GitHub!
github.com/crocs-muni/eacirc

Using genetics to improve encryption

Martin Ukrop, Petr Švenda, Marek Sýs, Václav Matyáš et alii

Problem statement

Randomness testing

The ciphertext produced by encryption should be completely indistinguishable from random data. But how to compare?

EACirc is a framework for designing a distinguisher – a simple program that decides whether generated ciphertext looks random enough.

1110 1011 → EACirc → binary ciphertext → XOR → try again / change wires and functions / analyze success → randomness verdict

Iterative design

The designed distinguisher is in the form of a gate circuit (layers of simple interconnected functions).

It processes binary data and outputs a randomness verdict. It is improved iteratively, using ideas from evolutionary algorithms (see the next section for details).

EACirc workflow

1. Forming a population

A set of currently considered partial solutions (gate circuits distinguishing cipher data from random data). The initial population is created randomly.

2. Test vector generation

Testing data for learning is sampled from both sources. That is, non-random data from the inspected cipher and random data from a truly random source.

500k 1110 1011 / 500k 0010 0101

3. Fitness assessment

Each circuit from the population is evaluated on all test vectors from the current set. Based on the outputs, it is assigned a fitness value from the interval [0,1].

1000x 1001 0101 | 00 11 | 11 00 | 01 00 — current test vector set (periodically renewed) — 0.792 0.503 0.357 0.845 0.228

5. Mutation & crossover

To form new individuals, we use mutation and crossover. Mutation makes small random changes in nodes and connectors. Crossover creates an offspring by combining different parts from two circuits taken from the population.

The new population now enters the evolution cycle again, gradually improving its fitness.

4. Survival of the fittest

Unfit individuals are discarded, better ones survive to the next generation. The higher the fitness, the bigger is the chance of survival.

The evolution works as a heuristics looking for better individuals – gate circuits distinguishing random and non-random data with higher probability than random guessing.

Comparison to existing tools

EACirc vs statistical testing

The standard way to assess randomness is to use batteries of statistical tests such as *NIST STS*, *Dieharder* or *TestU01*. We run them along with EACirc and compare the results.

To have a fine-grained comparison, we have analyzed 77 different functions (*eStream*, *SHA-3* and *CAESAR* candidates). For 2-round *Hermes* and 1-round *Fubuki* we confidently surpass *NIST STS*.

EACirc ✓ / NIST Statistical Testing Suite ✗ / Diehard(er) A Random Number Test Suite ✓ / … ✗

Further information

Interested in EACirc? See the papers referenced below or ask directly at the lab (CRoCS @ FI MU).

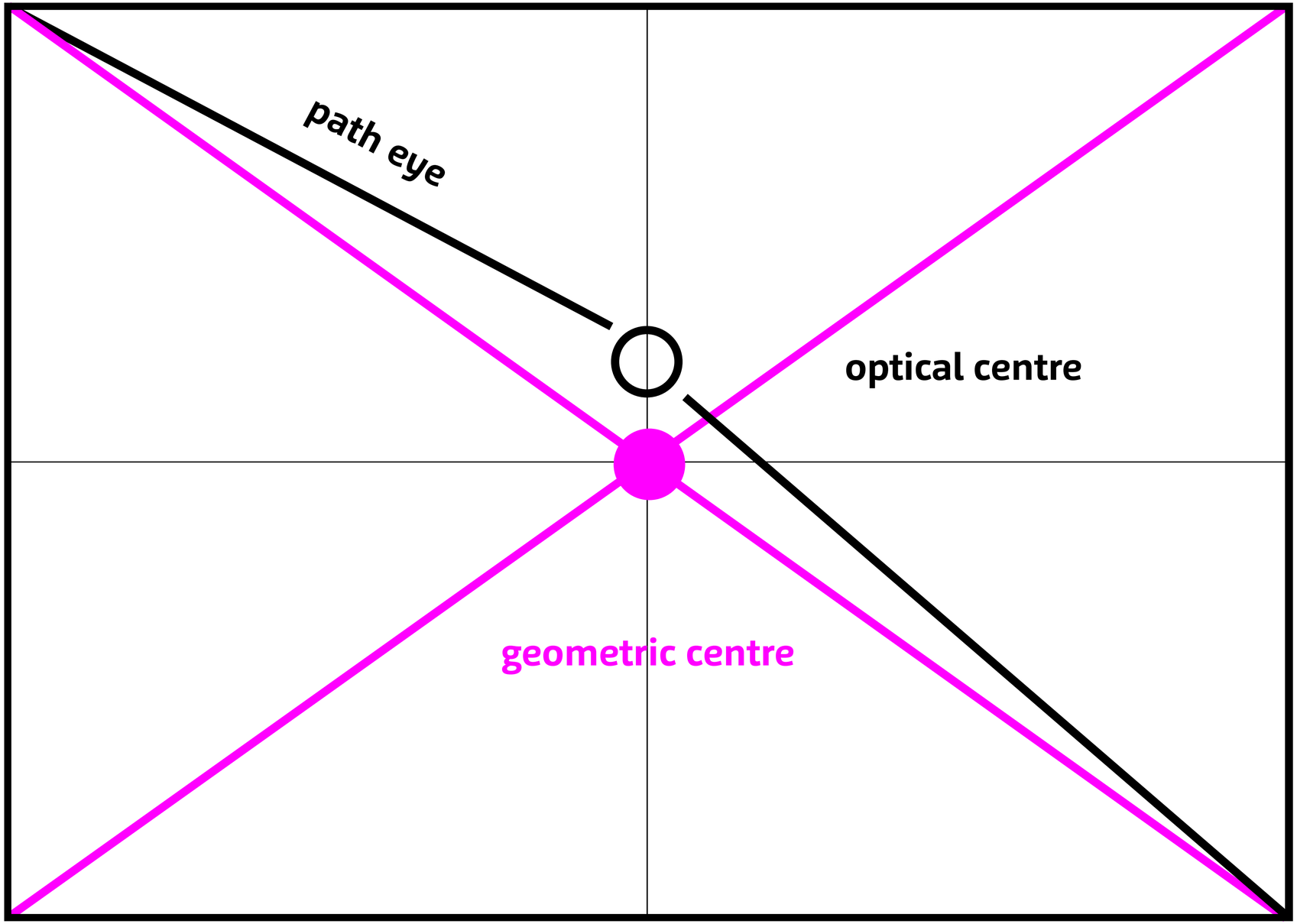
[1] Švenda, Ukrop, Matyáš. *Determining cryptographic distinguishers for eStream and SHA-3 candidate functions with evolutionary circuits.* In: E-Business and Telecommunications. Vol. 456 (SECRYPT 2013). Springer Berlin Heidelberg, 2014.

[2] Kubíček, Novotný, Švenda, Ukrop. *New results on reduced-round Tiny Encryption Algorithm using genetic programming.* IEEE Infocommunications. Vol. 8, iss. 1. 2016.

CROCS Centre for Research on Cryptography and Security

This work was supported by the Czech Science Foundation project GAP202/11/0422.

Comoposition
Optical centre



The optical center is a point that attracts the viewer's eye unless other visual elements pull the eye elsewhere.

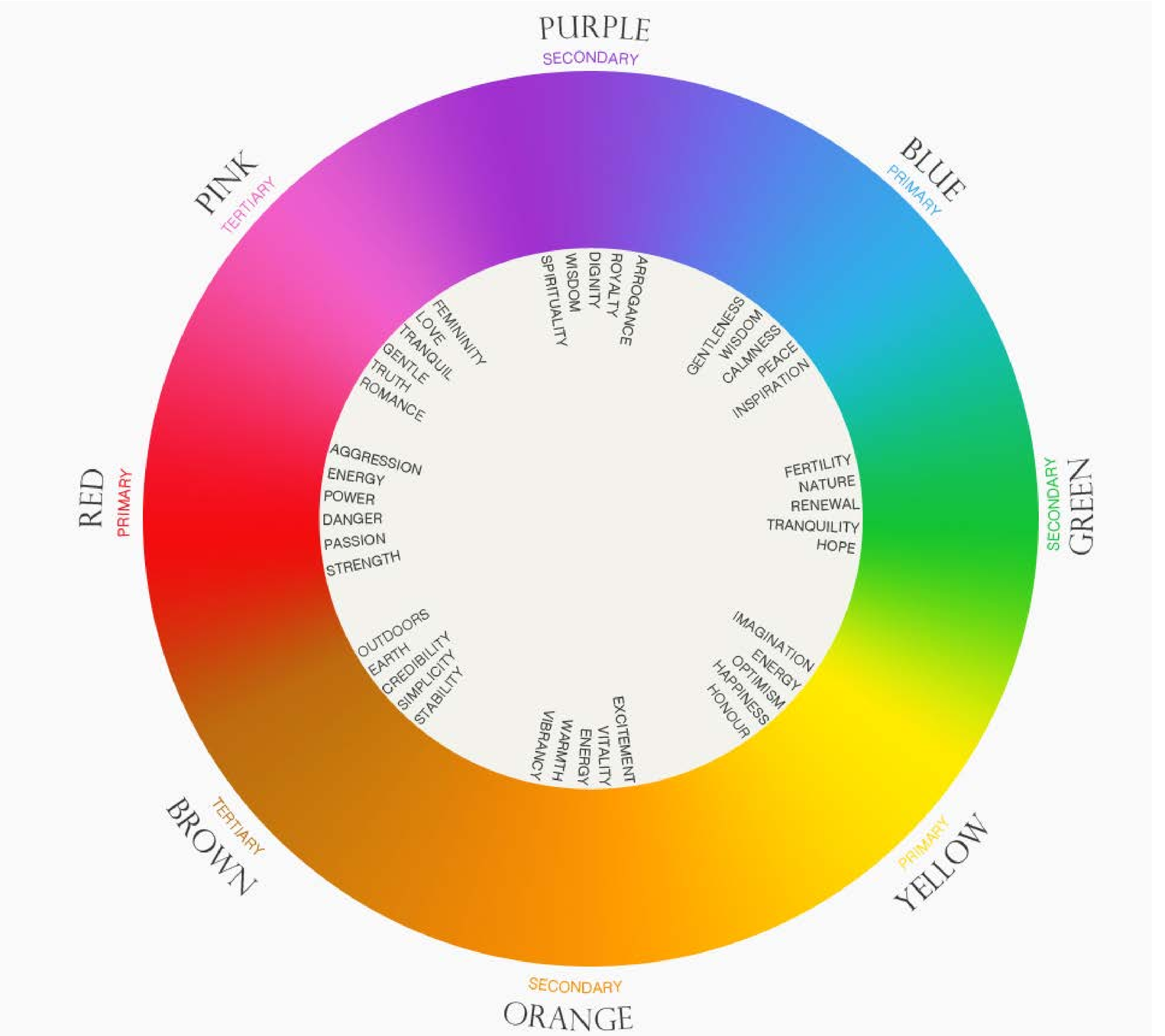

Colour

Colour

Meaning of colour is always completely accepted subjectively. The perception depends on two imperfect human organs – eyes and brain, depends on light waves.

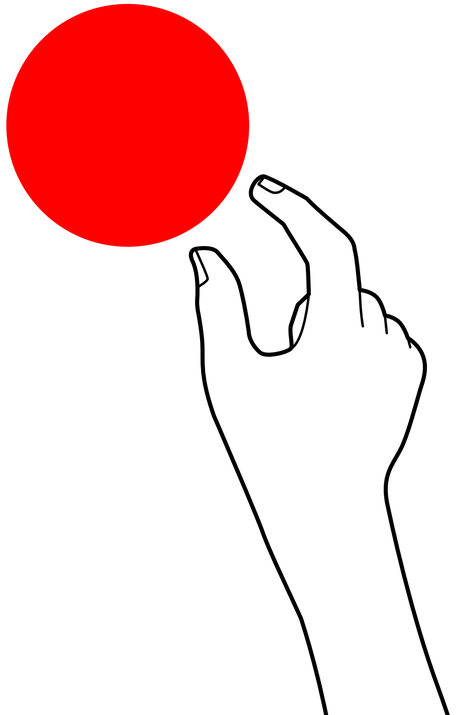
Colour has a powerful function in graphic design.

Colour defines hue, saturation and lighteness.

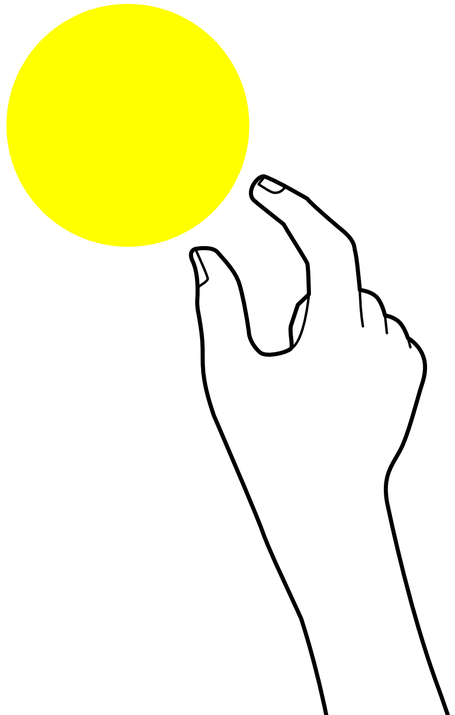


Warmer colours appear heavier than cooler colours

Red colour – seems to be heaviest colour



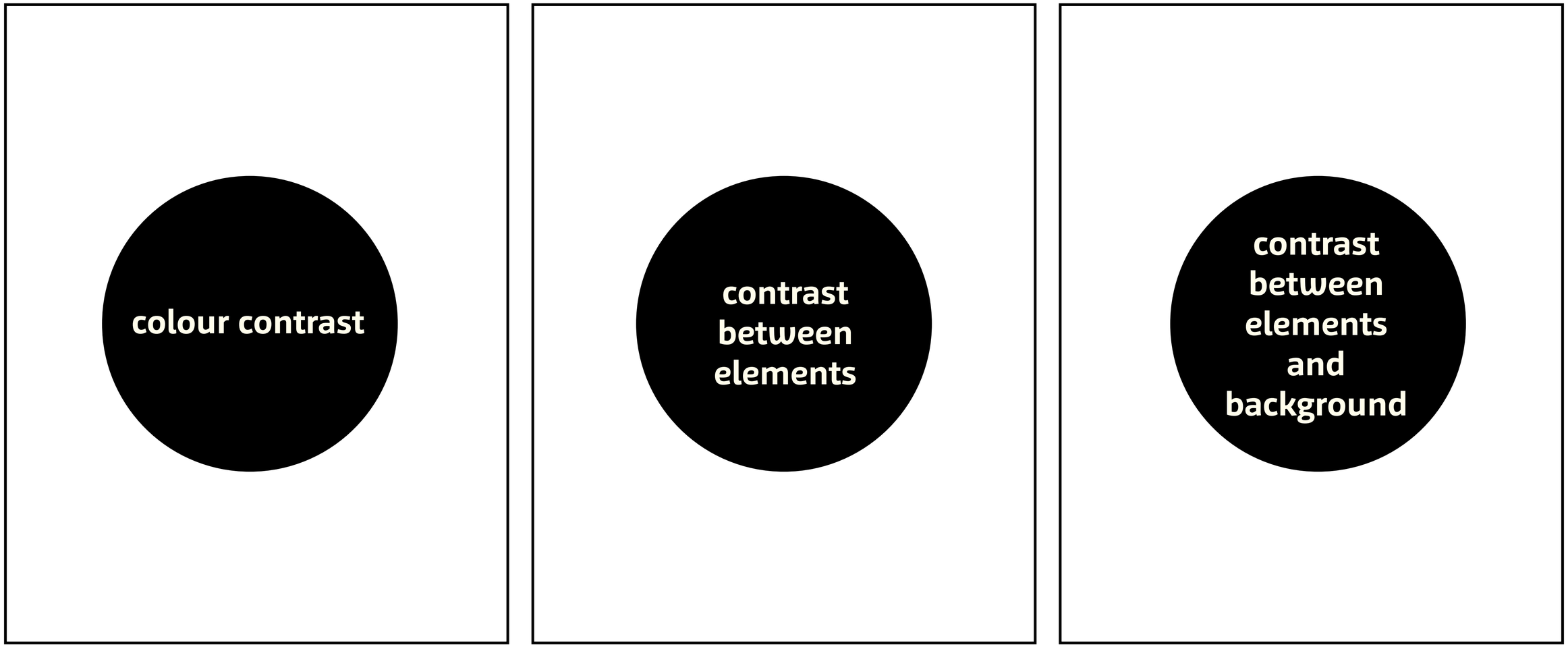
Yellow colour – seems to be lightest




Contrast

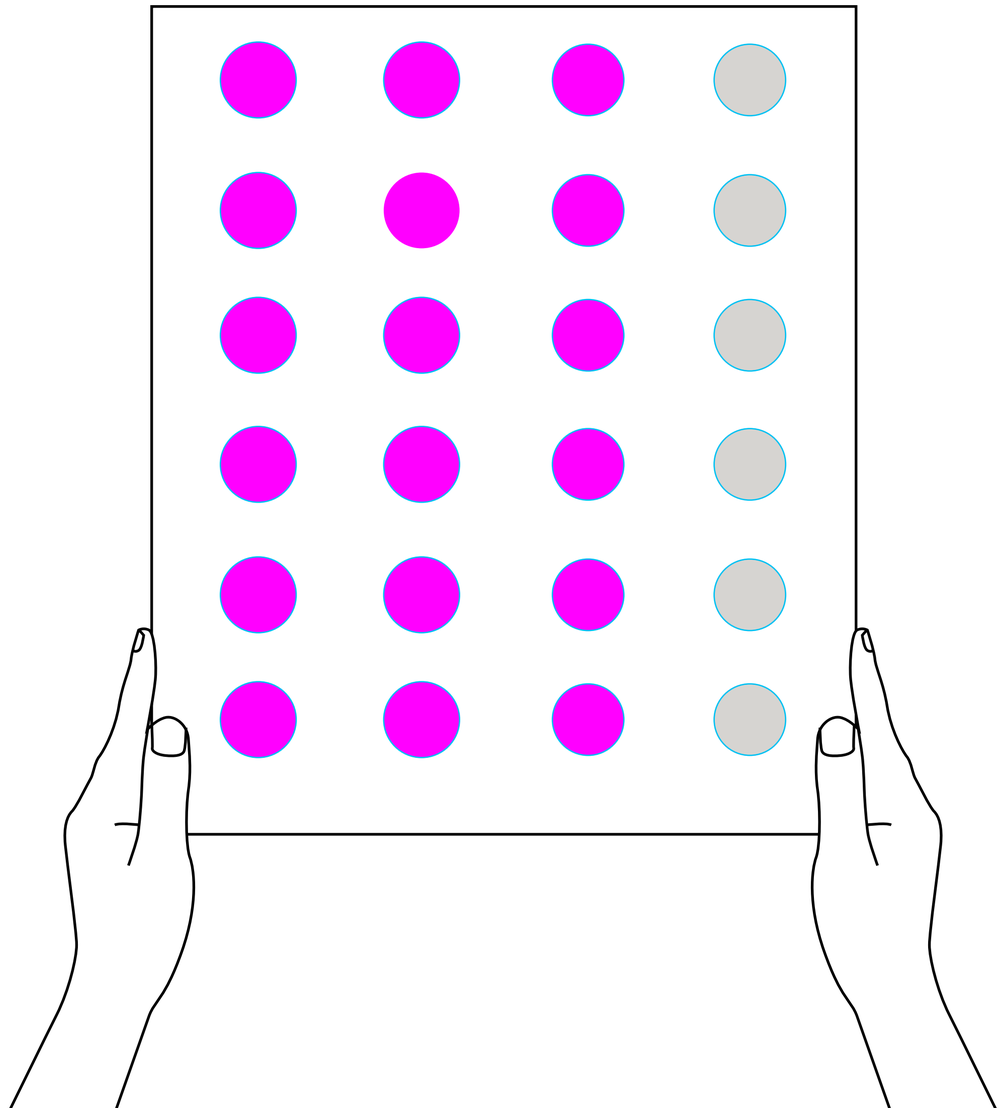
Contrast

Relation between two different elements

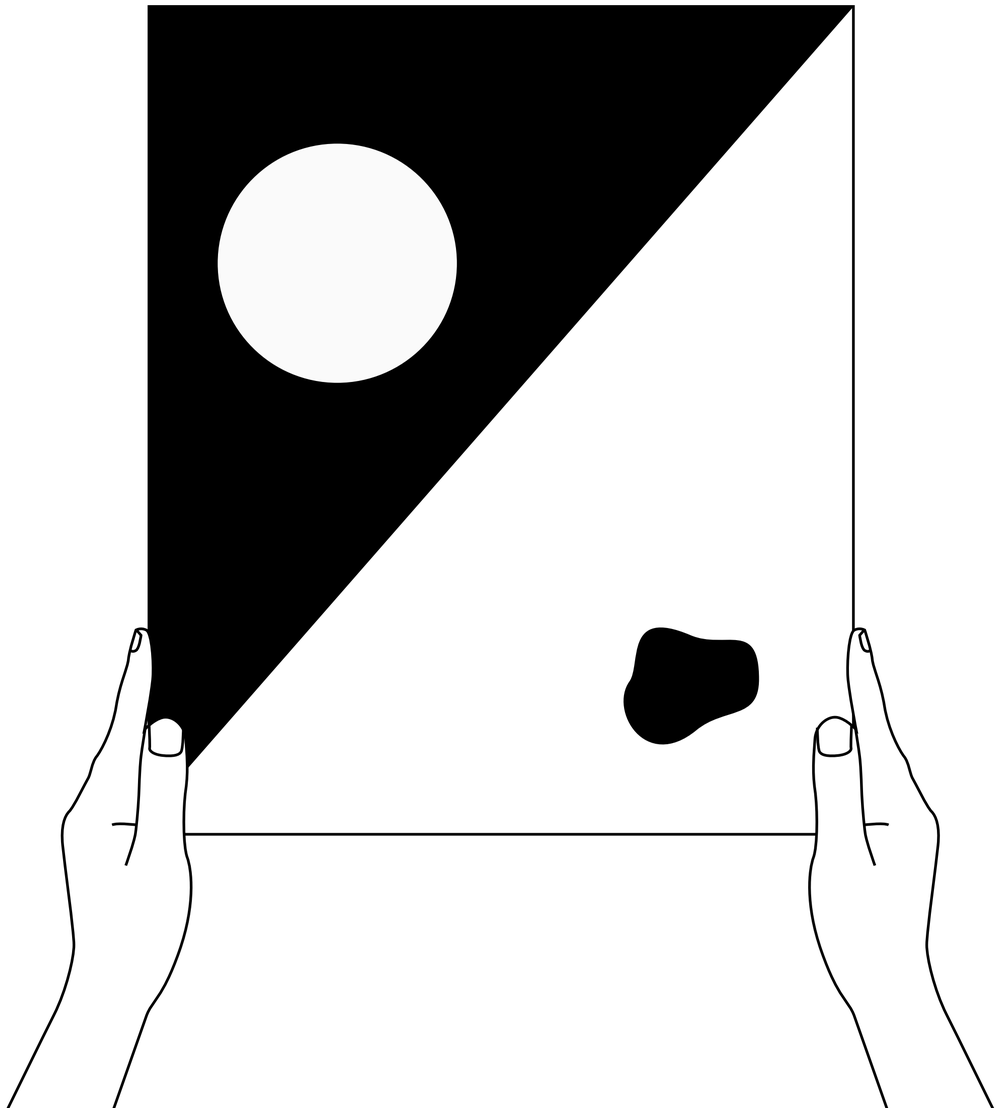


Contrast
Colour

High-Intensity colours appear heavier than low-intensity ones



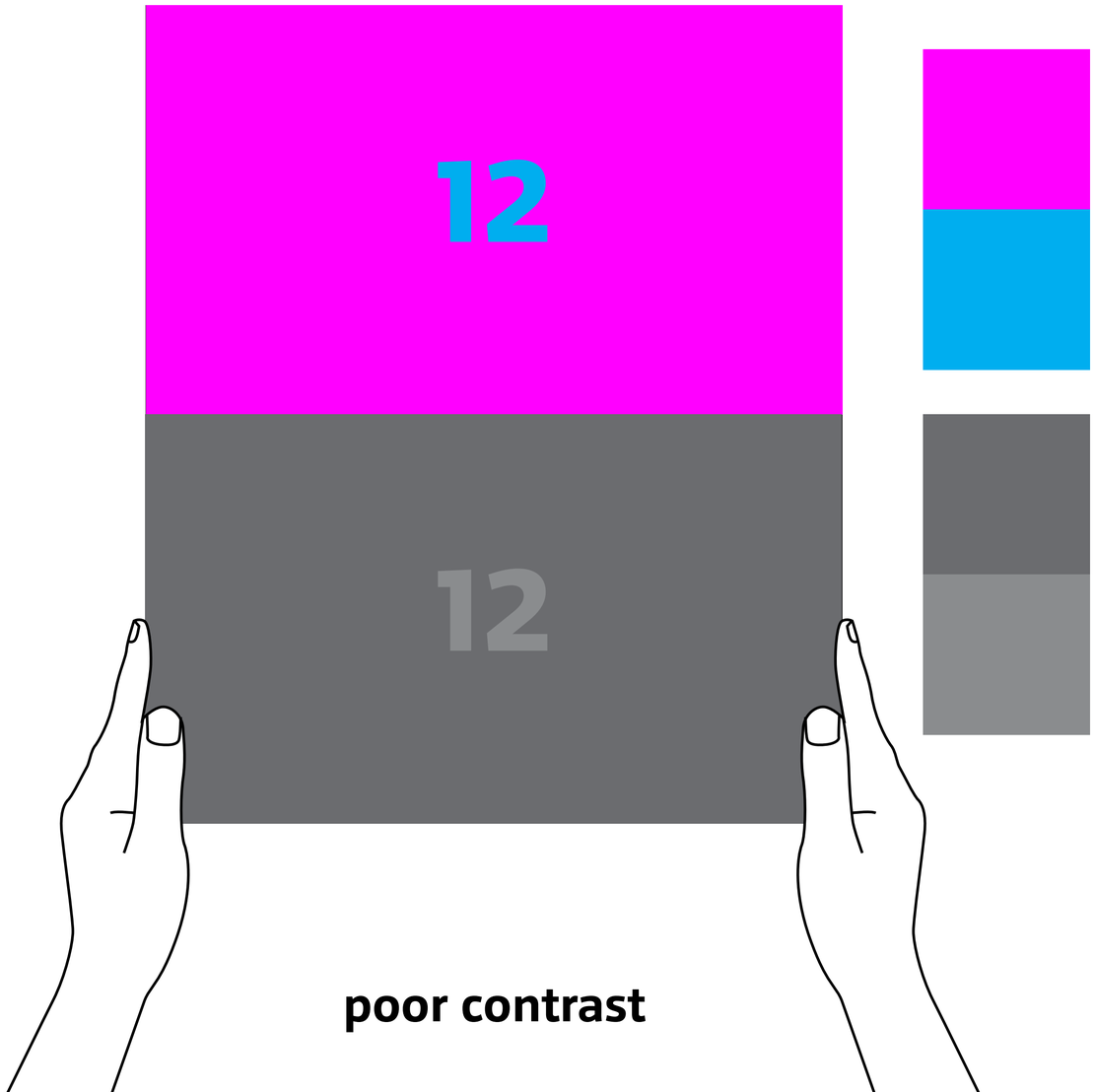
Contrast
Elements



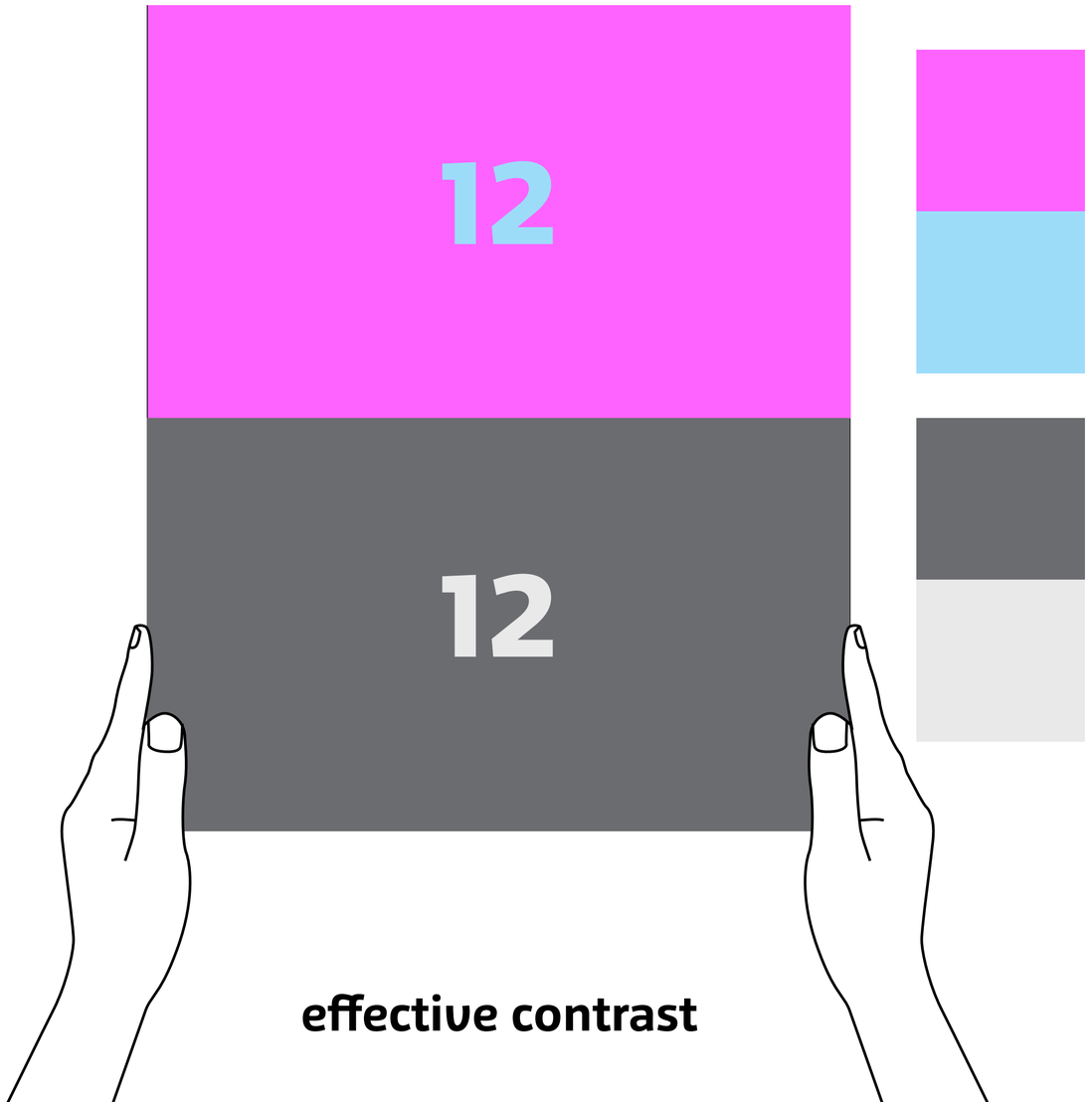
- positive and neagtive space
- geometric and biomorph shapes
- softness and sharpness
- stillness and movement
- big and small

Contrast
Elements and background

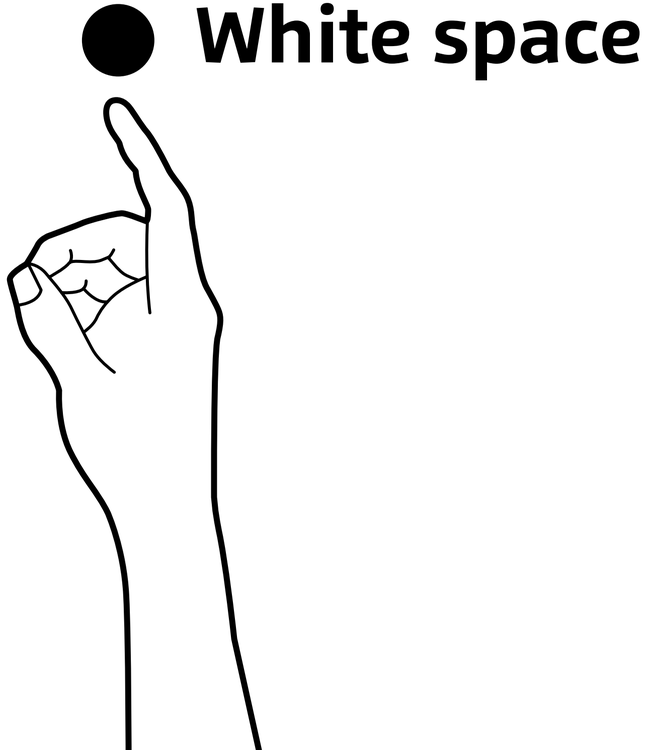
The higher the value-contrast, the heavier the weight of the object



poor contrast



effective contrast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in Spain

Housing

- government quarters
- rental guaranty
- on-the-economy

ON ANY permanent change of station, housing, or rather its availability, becomes the most important question asked by the service family. The common problems you meet in the United States are somewhat magnified on an overseas movement because of differences in language, law and custom. Actually, at least for Spain so our experiences have proved, these problems aren't very big at all if you're told beforehand what to expect.

First of all, at the time this booklet was published, automatic concurrent travel of dependents to Spain was authorized only for colonels and general officers. All other military personnel must apply to the appropriate overseas commander for concurrent travel. Specific instructions on how to do this can be obtained from your personnel officer. When the overseas commander grants approval for concurrent travel, he will tell you whether government quarters are or are not available. And, of course, this will determine many of your subsequent actions.

Government quarters consist of on-base and rental guaranty housing, some what similar to the so-called Wherry housing in the United States. On-base housing at the Air Force bases is very limited, ranging from 20-40 units and is restricted to key personnel.

The Rota Naval Base, where housing in the local communities is extremely limited, there are 496 on-base units. There is no rental guaranty housing in the Rota area. Forty-six units are under construction at the Cartagena Naval Facility. There are none at the El Ferrol Naval Facility.

There are 20 units each at the aircraft control and warning sites at Villatobas (W-2) and Constantina (W-3). Twenty units are under construction at Rosas (W-4) and Benidorm (W-5). Housing is under design for some of the other sites.

RENTAL GUARANTY HOUSING

In the Madrid area (this includes the Joint U. S. Military Group, Spain; MAAG; NAVACTS, Spain; Headquarters Sixteenth Air Force; Headquarters, 65th Air Division; Torrejón Air Base and several smaller units there are 866 housing units, called Royal Oaks, located five miles north of Madrid and approximately 20 miles from Torrejón Air Base.

In Zaragoza, there are 222 units; in Sevilla (Morón and San Pablo air bases), there are 494 units about one mile from the city.

All units are spacious, although the bedrooms are somewhat smaller than American standards since emphasis has been placed on the living-dining areas. A typical two-bedroom unit has a large terrace, living room, dining room, master bedroom, a smaller bedroom, bath, kitchen, utility room, storage room, and a maid's room and bath. The larger units are basically the same.

If you are notified that you are to occupy government quarters—either on-base or rental guaranty—you will be allowed to ship only 2,000 pounds of household goods, plus your hold baggage and hand luggage. All government quarters are adequately and comfortably furnished, including stove, refrigerator, automatic washer-dryer combination, vacuum cleaners, rugs and draperies. Also included are lamps, waste-paper baskets, porch furniture, ironing board, etc.

Personnel being assigned to Rota Naval Base should note that there units do not include washing machines or clothes driers.

Normally, you will need bring only dishes, silverware, pots and pans, linens (including pillows and blankets), and personal items. You will probably want to bring your small appliances—iron, mixer, toaster— actually, all items of this type work well in Spain and will save you as much work as they do in the United States. You should include in your 2,000 pound weight limit all special items for babies and small children since no items of this nature are furnished. This would include cribs, youth beds (if you use them), vaporizers, bottle sterilizers, etc. As a matter of fact, if you are traveling with a bottle-baby, we suggest you include in your hand baggage (that is, bring it with you) a bottle sterilizer—the type you can use on the top of a stove. By the way, plastic bottles are much more practical. Include extra nipples.

Consider your sports equipment, children's toys, etc., in the 2,000 pounds. Hold baggage, which will arrive much sooner than your furniture, should include those items you will immediately need. We found this meant the baby crib, some toys, a tool kit (hammer, saw, pliers, screwdrivers, etc.), dishes, pots and pans and other cooking paraphernalia, silverware, linens, blankets —enough to set up temporary housekeeping for about six to eight weeks.

In our hand baggage, other than clothing which is discussed elsewhere, we included extra tooth paste, razor blades, at least one toy per child, and other small personal items which you cannot conveniently buy while enroute.

ON ECONOMY HOUSING

Living on the economy, according to the many Americans who do so, provides a lively and interesting contrast to the American way of life. True, the differences are sometimes frustrating, but they are usually minor, and don't detract from the opportunity to learn the language and customs of Spain. Whether you eventually choose a house (of which there are very few) or an

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Ladislav Sutnar

in Spain

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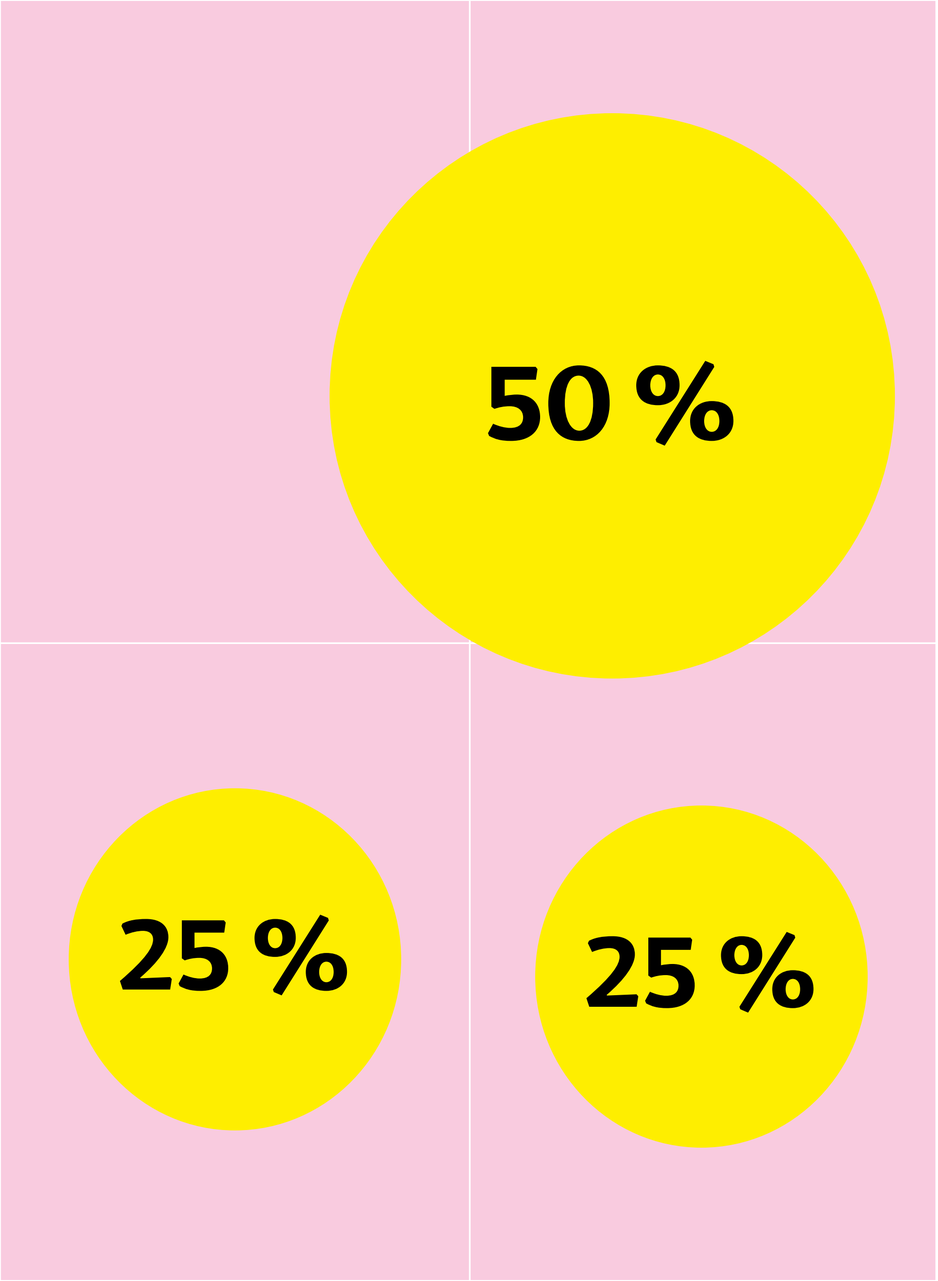

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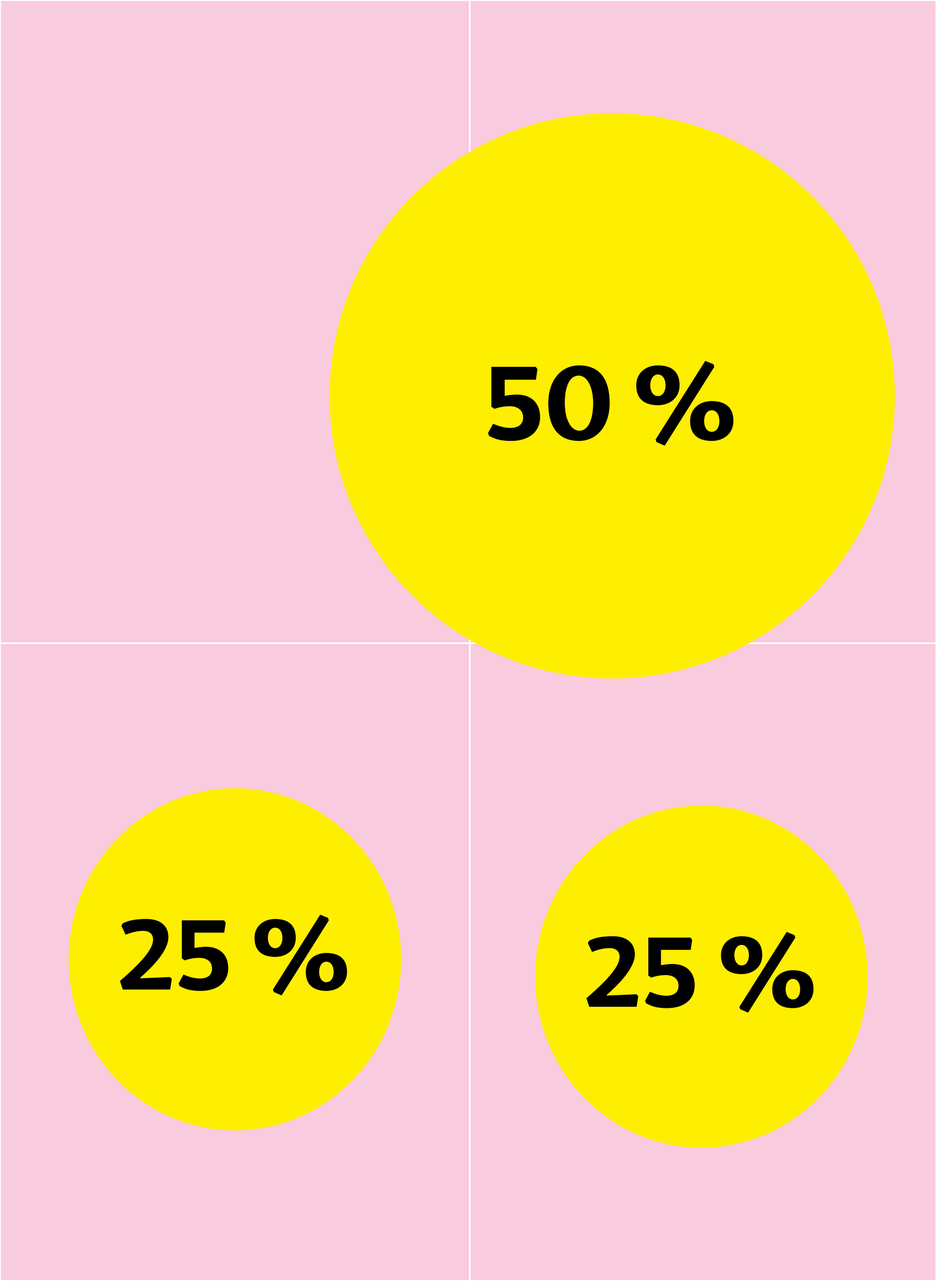

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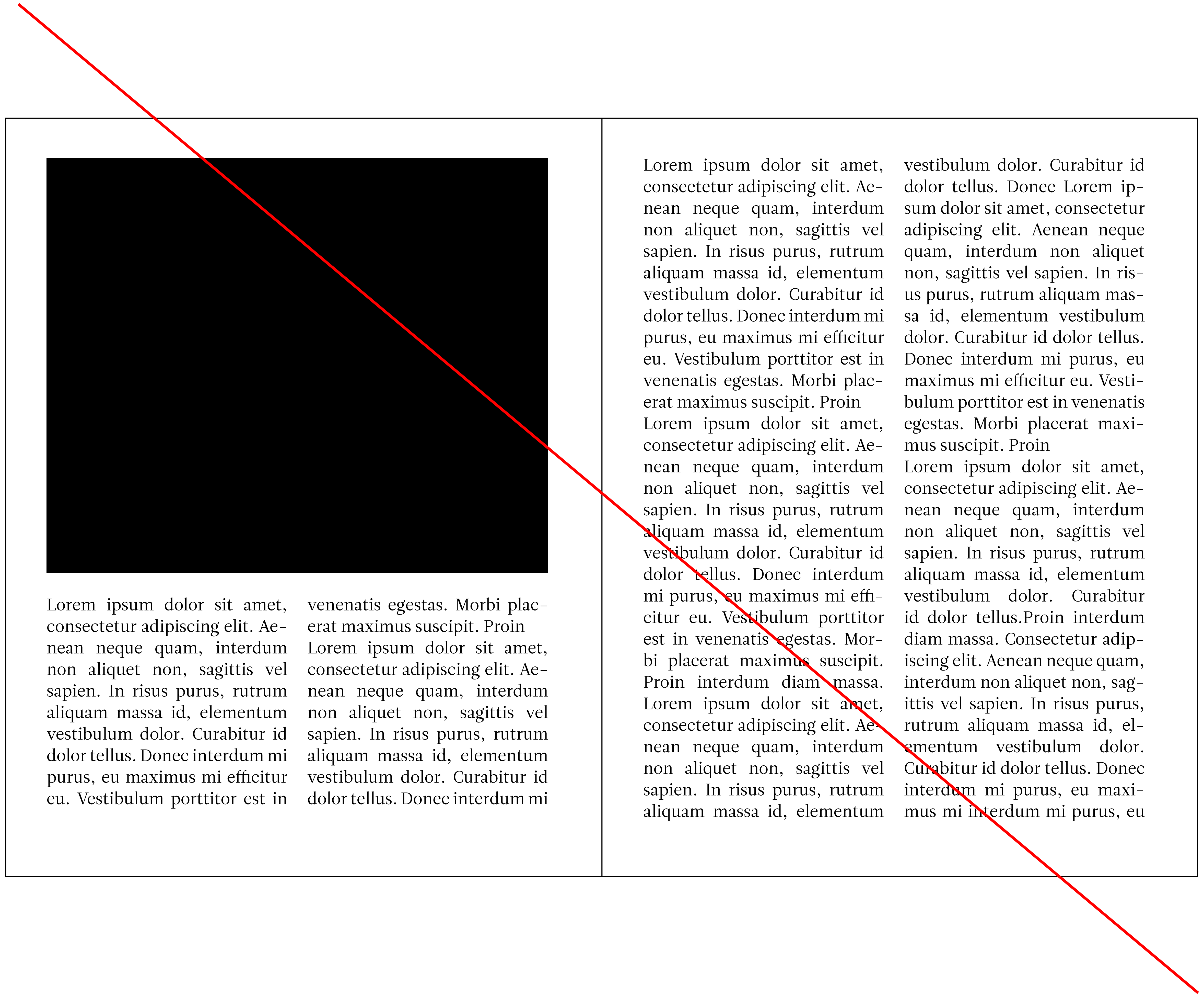

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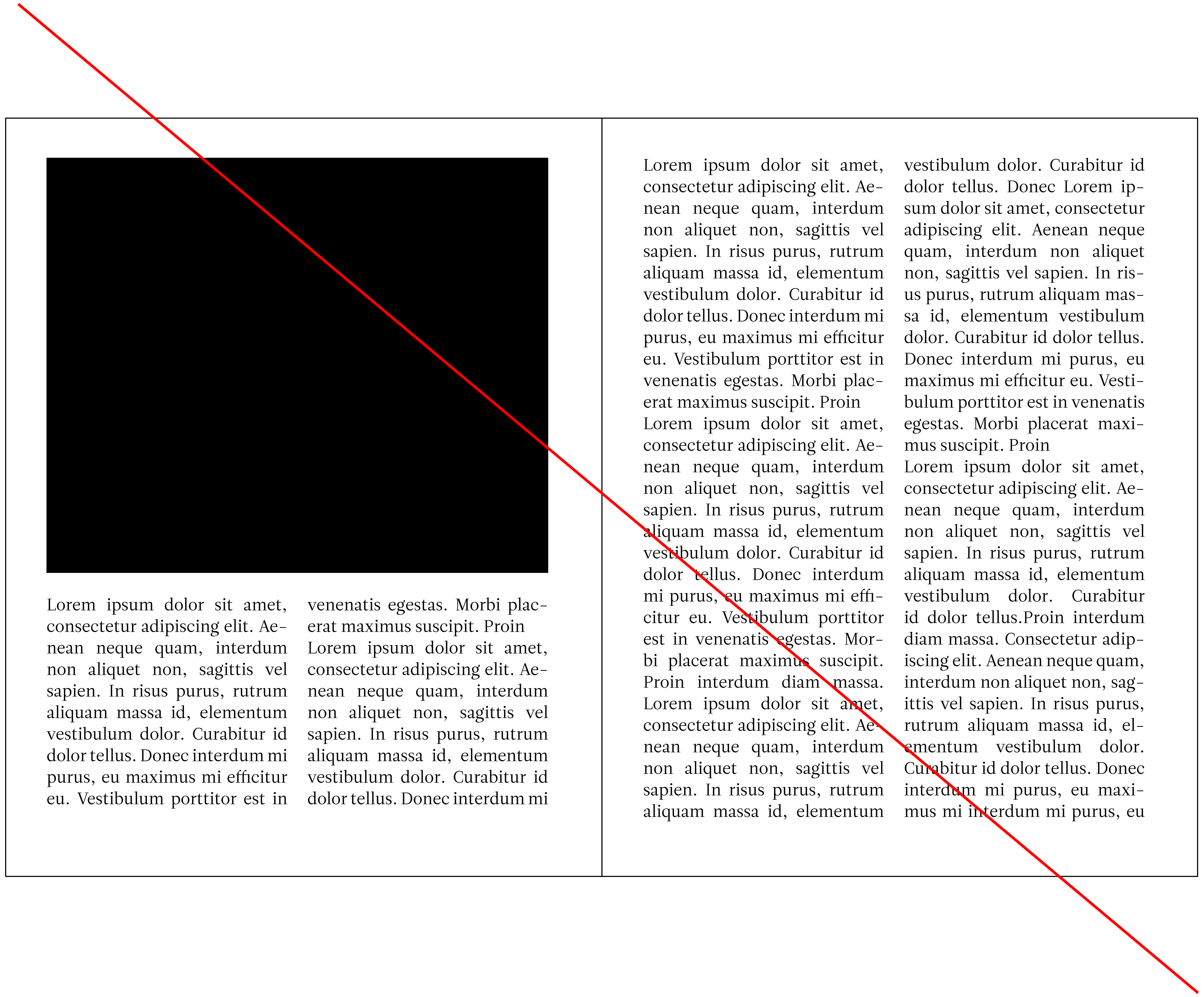

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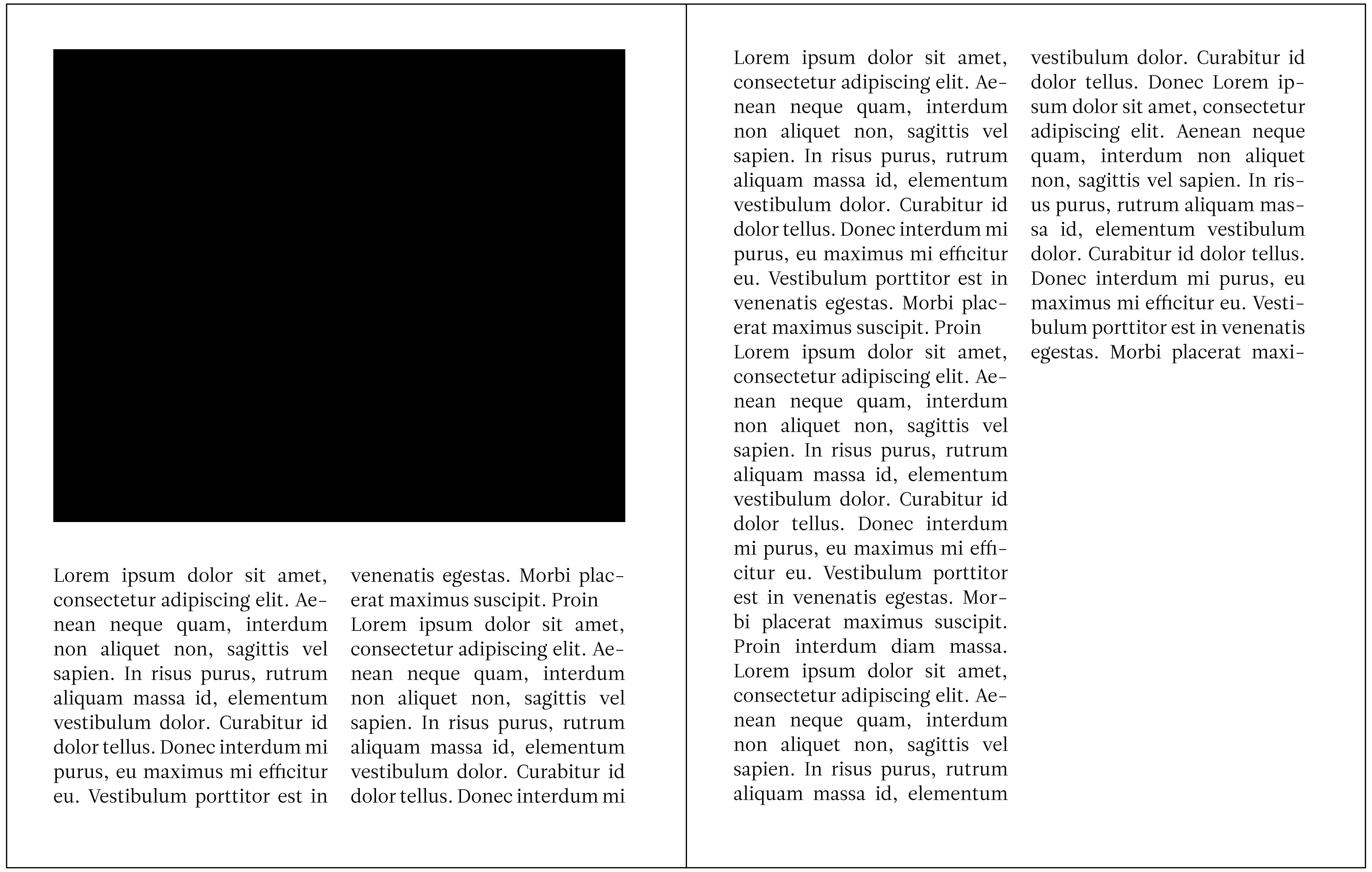

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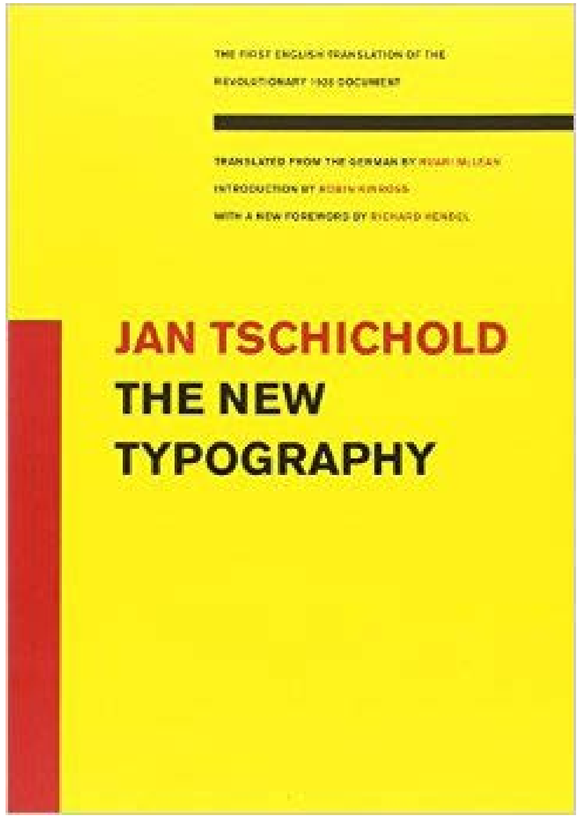
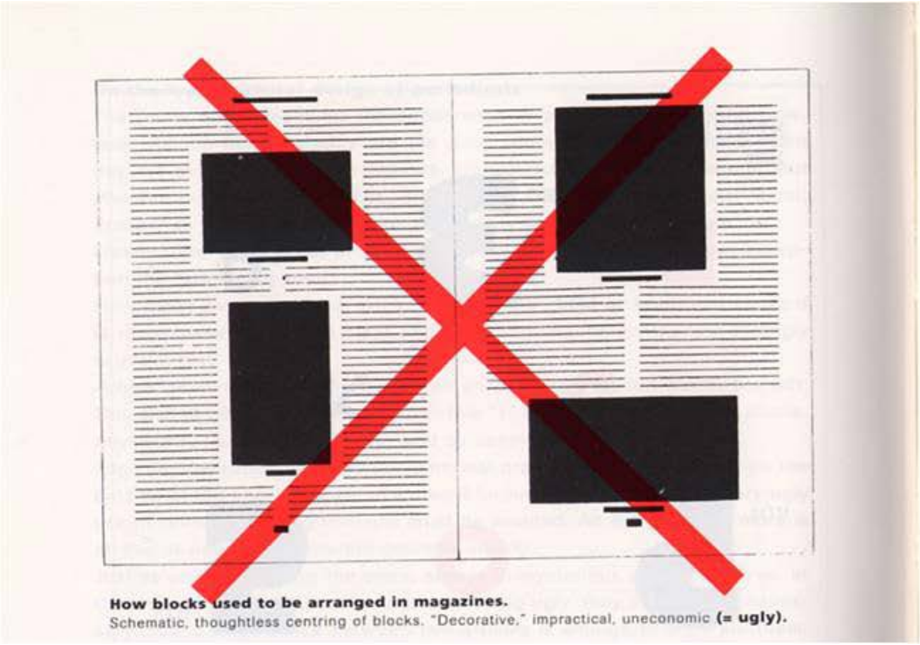
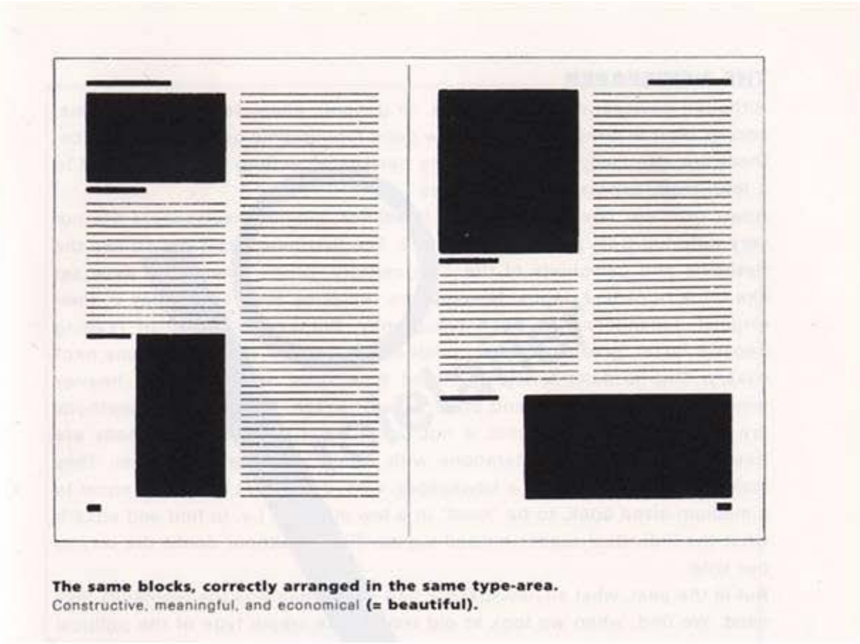
Case study
White space

Jan Tschichold
Die neue typographie





How blocks used to be arranged in magazines.
Schematic, thoughtless centring of blocks. "Decorative," impractical, uneconomic **(= ugly).**



The same blocks, correctly arranged in the same type-area.
Constructive, meaningful, and economical **(= beautiful).**

Case study
White space

FACULTY OF INFORMATICS
Masaryk University

Verification of Programs with Inputs

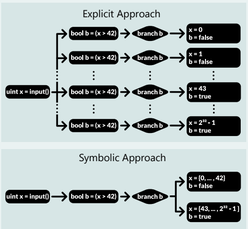
Henrich Lauko, Vladimír Štill, Petr Ročkai, Jan Mrázek and Jiří Barnat

DIVINE

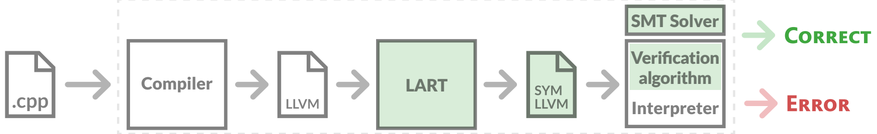
DIVINE is a tool for verification of parallel C++ programs. By using the LLVM compilation framework with the Clang compiler and the libc++ library it provides support for most of the standard C++ library and all the C++ language features. DIVINE is rather efficient when dealing with programs without inputs (for example test cases). A big downside of the current version of DIVINE is that for programs with inputs, this input has to be simulated by nondeterministic choice which is very inefficient. Therefore we present an approach for symbolic representation of inputs in DIVINE.

Symbolic States

Consider a simple program with 32 bit input variable **x** and a branch on the value of this variable. In the current DIVINE, this program gives rise to 2^{32} possible memory configurations. In symbolic version, possible values of variables **x** and **b** are represented symbolically using bitvector formulae, therefore, there are only two possible configurations at the end of the program.



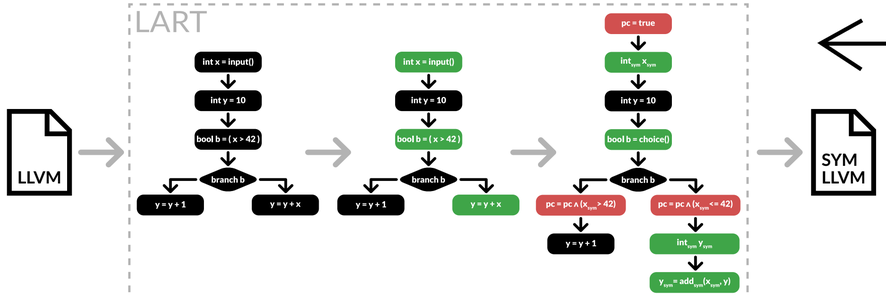
Proposed Approach



To take advantage of symbolic representation of states, we transform the LLVM bitcode in such a way that it represents variables which can contain values dependent on inputs symbolically. This transformation is performed by LART and is resented in detail later. Apart from that, the verification algorithm is modified to handle symbolic states with the help of an SMT solver.

Our approach aims for minimizing changes to the LLVM interpreter that is used to execute instructions in DIVINE. The reason is that the interpreter is complex and performance tuned and therefore it is not desirable to make it even more complex by adding symbolic data manipulation into it. Instead, symbolic data are to be handled by the program itself. To encode symbolic manipulations into the program we transform the LLVM bitcode produced by the compiler and create symbolic LLVM from it. This not only minimizes changes to the interpreter, but the transformation can also be used for different representation of symbolic data quite easily. The transformation is handled by LART – LLVM Abstraction & Refinement Tool. Furthermore, DIVINE's verification algorithm has to be modified. It has to check if symbolic states are valid (nonempty), that is if they can represent at least one concrete state. It also has to handle comparison of symbolic states. For both of these tasks, DIVINE has to extract SMT formulae from the program state and use SMT solver.

Details of Program Transformation



LLVM bitcode is generated from C++ source code.

Dependence graph of LLVM instructions is created from the control flow of a program.

Instructions dependent on the input are computed.

Dependent instructions are substituted with symbolic calls, path condition manipulations are added.

A program simulating original instructions in a symbolic manner.

LART takes the LLVM bitcode of the program and libraries produced by the compiler and transforms it into a bitcode which manipulates data symbolically. In this modified program, any variable which can depend on an input value is represented symbolically using bitvector formulae. Bitvector formulae describe integers of fixed bit width with overflow and bitwise operations, and therefore are well suited for exact representation of computer integers. All the manipulations with such variables have to be transformed to their symbolic versions which modify the formulae accordingly. Furthermore, any branch which depends on an input value has to put constraints on the possible values of symbolic variables (this constraint is given in the form of a path condition formula).

ParaDiSe
Parallel & Distributed Systems Laboratory

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Case study
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Real-time Analysis of NetFlow Data for Generating Network Traffic Statistics using Apache Spark

Milan Čermák, Tomáš Jirsík, Martin Laštovička

Institue of Computer Science, Masaryk University
Botanická 68a, 602 00, Brno, Czech Republic
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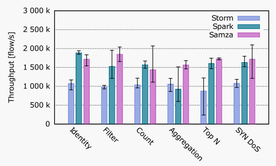
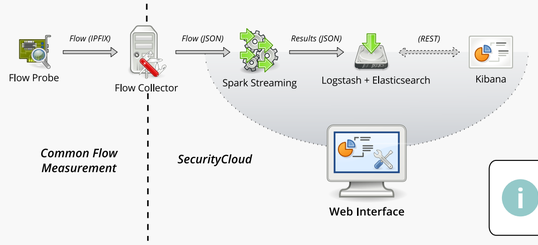
Abstract — We present a framework for the realtime generation of network traffic statistics on Apache Spark Streaming, a modern distributed stream processing system. Our previous results [1] showed that stream processing systems provide enough throughput to process a large volume of NetFlow data and hence they are suitable for network traffic monitoring. This demo describes the integration of Apache Spark Streaming into a current network monitoring architecture. We prove that it is possible to implement the same basic methods for NetFlow data analysis in the stream processing framework as in the traditional ones. Moreover, our stream processing implementation discovers new information which is not available when using traditional network monitoring approaches.

Systems Performance Benchmark — Four Nodes (32 vCPUs)



- Samza and Spark have a high-enough flow throughput and can be used for the analysis of data from multiple networks at the same time.
- Apache Spark system has been chosen as it offers an easy management and a high versatility in terms of the running environment and proprietary processing methods (e.g., sliding window).

Framework Architecture



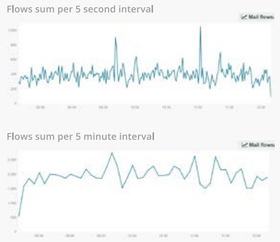
The demonstration cluster consists of 7 virtual machines, one is dedicated to IPFIXcol, 5 to Spark and one to the Kibana and Web server. The following configuration is the same for all machines:

- (4 vCPUs) Intel(R) Xeon(R) CPU E5-2680 0 @ 2.70GHz,
- 8GB 1600MMHz DIMM DRAM EDO,
- 85GB SCSI Disk with 53c1030 PCI-X Fusion-MPT Dual Ultra320 SCSI,
- 10 Gbit/s network connection, 1 Gbit/s virtual NICs.

IPFIXcol is a flexible IPFIX flow data collector designed to be easily extensible by plugins. In our demonstration, we use only part of its wide functionality – data acquisition from multiple network probes and their transformation into a JSON data stream.

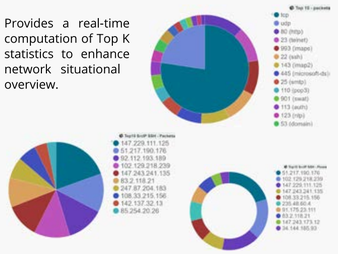
Statistics Volatility of Network Traffic Data

- Stream processing provides more accurate statistics about network traffic.
- Statistics generated by the stream processing showed increased volatility in results compared to traditional flow data processing approaches.
- Allows to observe short, but strong bursts of the network traffic that were lost due to the aggregation used in traditional batch approaches.



Real-time TOP K Statistics

Provides a real-time computation of Top K statistics to enhance network situational overview.



SecurityCloud

References

[1] M. Čermák, D. Tovarňák, M. Laštovička, and P. Čeleda. *A Performance Benchmark for NetFlow Data Analysis on Distributed Stream Processing Systems*. In Proceedings of NOMS, 2016.

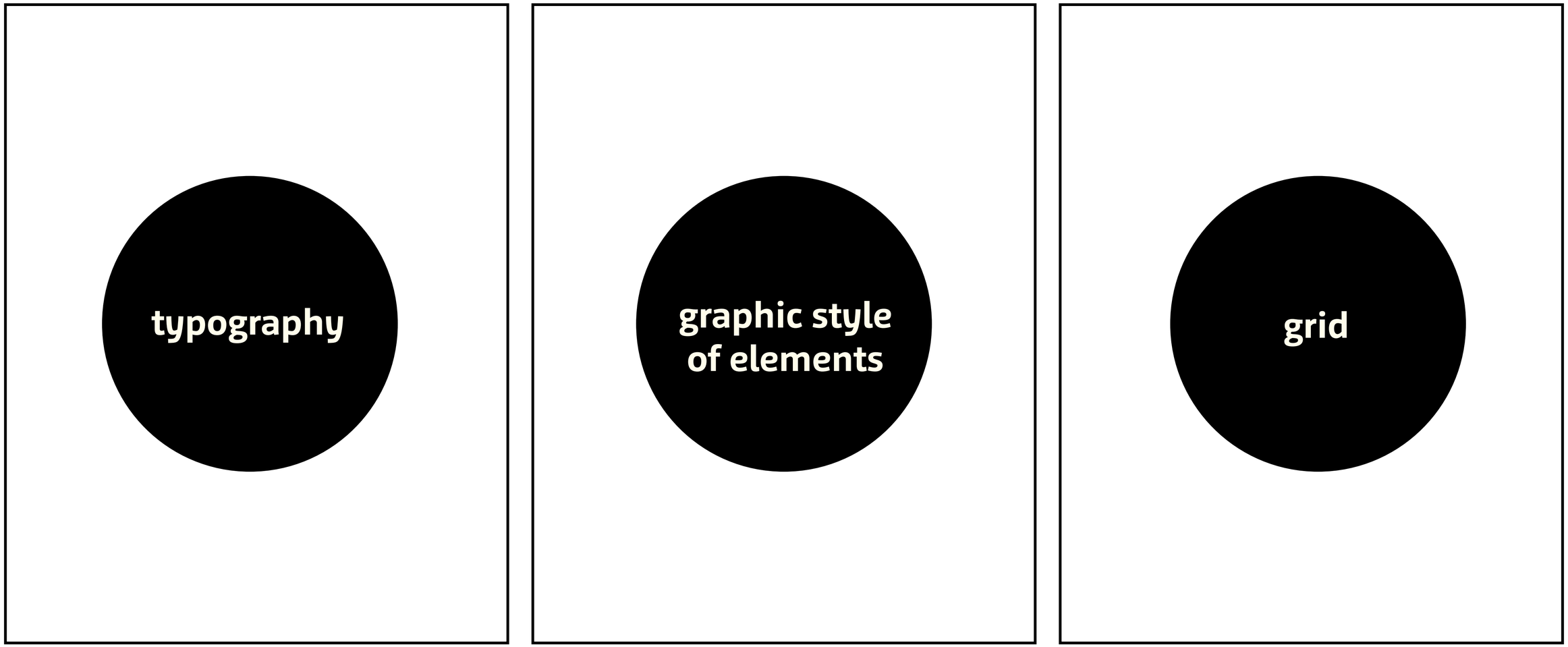
Acknowledgements

T A Č R This research was supported by the Technology Agency of the Czech Republic under No. **TA04010062** *Technology for processing and analysis of network data in big data concept*.


Unity

Unity

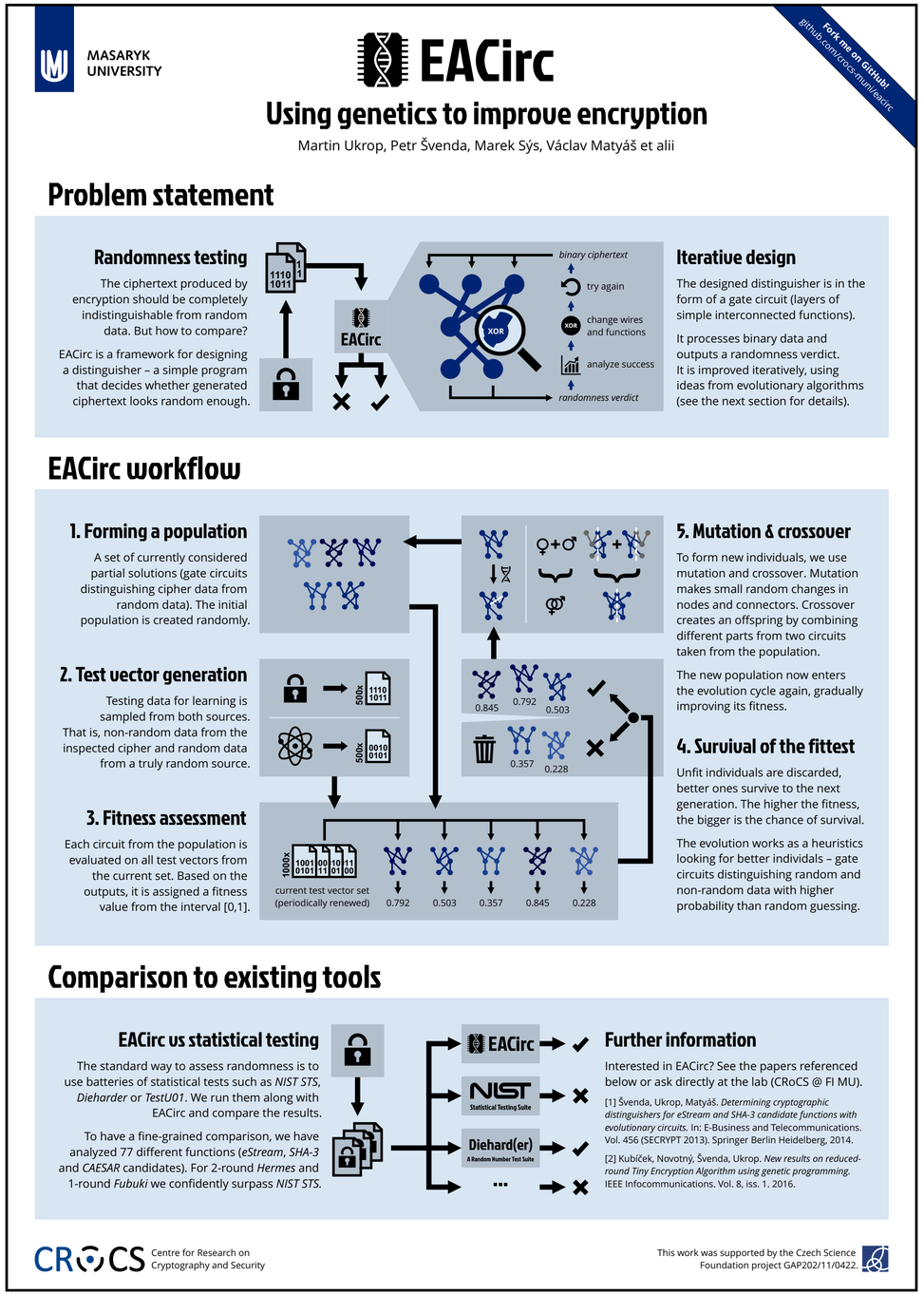
All elements should collerate together



Case study
Graphic design style

san serif typography

left and right alignment



MASARYK UNIVERSITY

EACirc

Using genetics to improve encryption

Martin Ukrop, Petr Švenda, Marek Sýs, Václav Matyáš et alii

Fork me on GitHub! github.com/crocs-muni/eacirc

Problem statement

Randomness testing

The ciphertext produced by encryption should be completely indistinguishable from random data. But how to compare?

EACirc is a framework for designing a distinguisher – a simple program that decides whether generated ciphertext looks random enough.

binary ciphertext
try again
change wires and functions
analyze success
randomness verdict

Iterative design

The designed distinguisher is in the form of a gate circuit (layers of simple interconnected functions).

It processes binary data and outputs a randomness verdict. It is improved iteratively, using ideas from evolutionary algorithms (see the next section for details).

EACirc workflow

1. Forming a population

A set of currently considered partial solutions (gate circuits distinguishing cipher data from random data). The initial population is created randomly.

2. Test vector generation

Testing data for learning is sampled from both sources. That is, non-random data from the inspected cipher and random data from a truly random source.

500x 1110 1011

500x 0010 0101

3. Fitness assessment

Each circuit from the population is evaluated on all test vectors from the current set. Based on the outputs, it is assigned a fitness value from the interval [0,1].

1000x 1001 0101 00 11 10 01 11 00

current test vector set (periodically renewed)

0.792 0.503 0.357 0.845 0.228

0.845 0.792 0.503

0.357 0.228

4. Survival of the fittest

Unfit individuals are discarded, better ones survive to the next generation. The higher the fitness, the bigger is the chance of survival.

The evolution works as a heuristics looking for better individuals – gate circuits distinguishing random and non-random data with higher probability than random guessing.

5. Mutation & crossover

To form new individuals, we use mutation and crossover. Mutation makes small random changes in nodes and connectors. Crossover creates an offspring by combining different parts from two circuits taken from the population.

The new population now enters the evolution cycle again, gradually improving its fitness.

Comparison to existing tools

EACirc vs statistical testing

The standard way to assess randomness is to use batteries of statistical tests such as *NIST STS*, *Dieharder* or *TestU01*. We run them along with EACirc and compare the results.

To have a fine-grained comparison, we have analyzed 77 different functions (*eStream*, *SHA-3* and *CAESAR* candidates). For 2-round *Hermes* and 1-round *Fubuki* we confidently surpass *NIST STS*.

EACirc ✓
NIST Statistical Testing Suite ✗
Diehard(er) A Random Number Test Suite ✓
... ✗

Further information

Interested in EACirc? See the papers referenced below or ask directly at the lab (CRoCS @ FI MU).

[1] Švenda, Ukrop, Matyáš. *Determining cryptographic distinguishers for eStream and SHA-3 candidate functions with evolutionary circuits.* In: E-Business and Telecommunications. Vol. 456 (SECRYPT 2013). Springer Berlin Heidelberg, 2014.

[2] Kubíček, Novotný, Švenda, Ukrop. *New results on reduced-round Tiny Encryption Algorithm using genetic programming.* IEEE Infocommunications. Vol. 8, iss. 1. 2016.

CROCS Centre for Research on Cryptography and Security

This work was supported by the Czech Science Foundation project GAP202/11/0422.

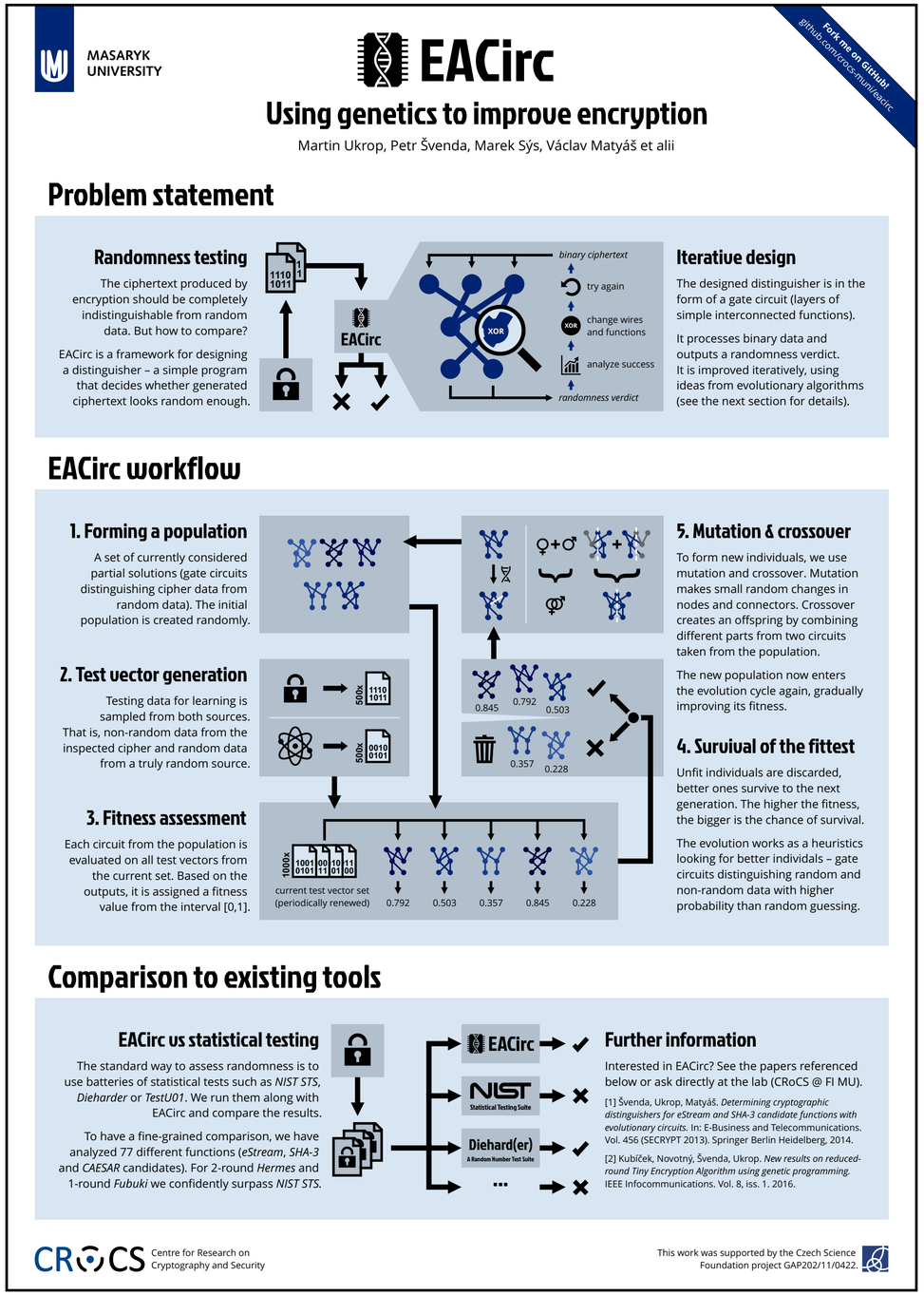
Style of typography

Case study
Unity

same styles of arrows

same colour of background shapes

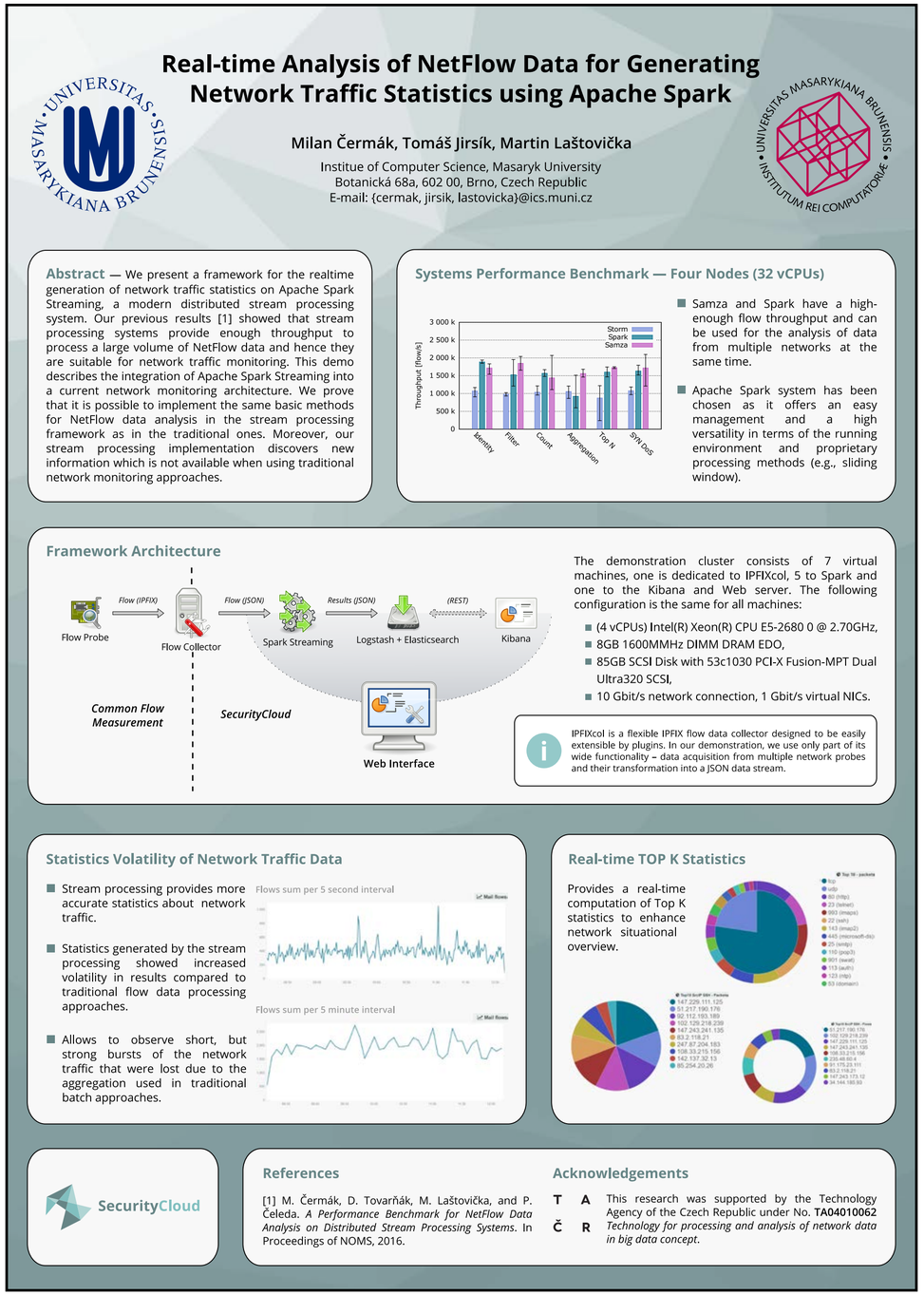
same weights of strokes



Same graphic style should be applied on each element

Case study
Unity

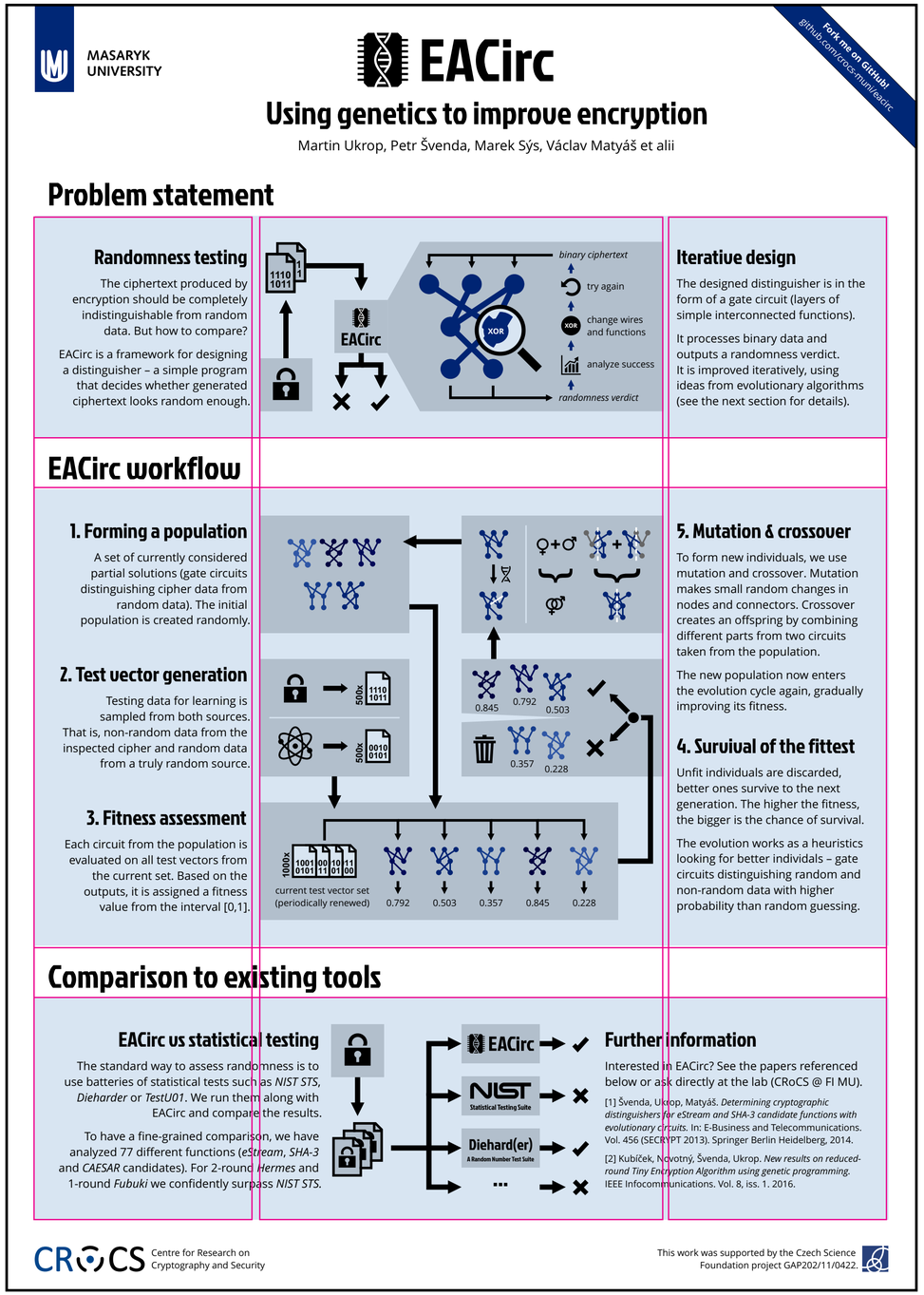
different styles of graphics



Same graphic style should be applied on each element

Case study
Grid

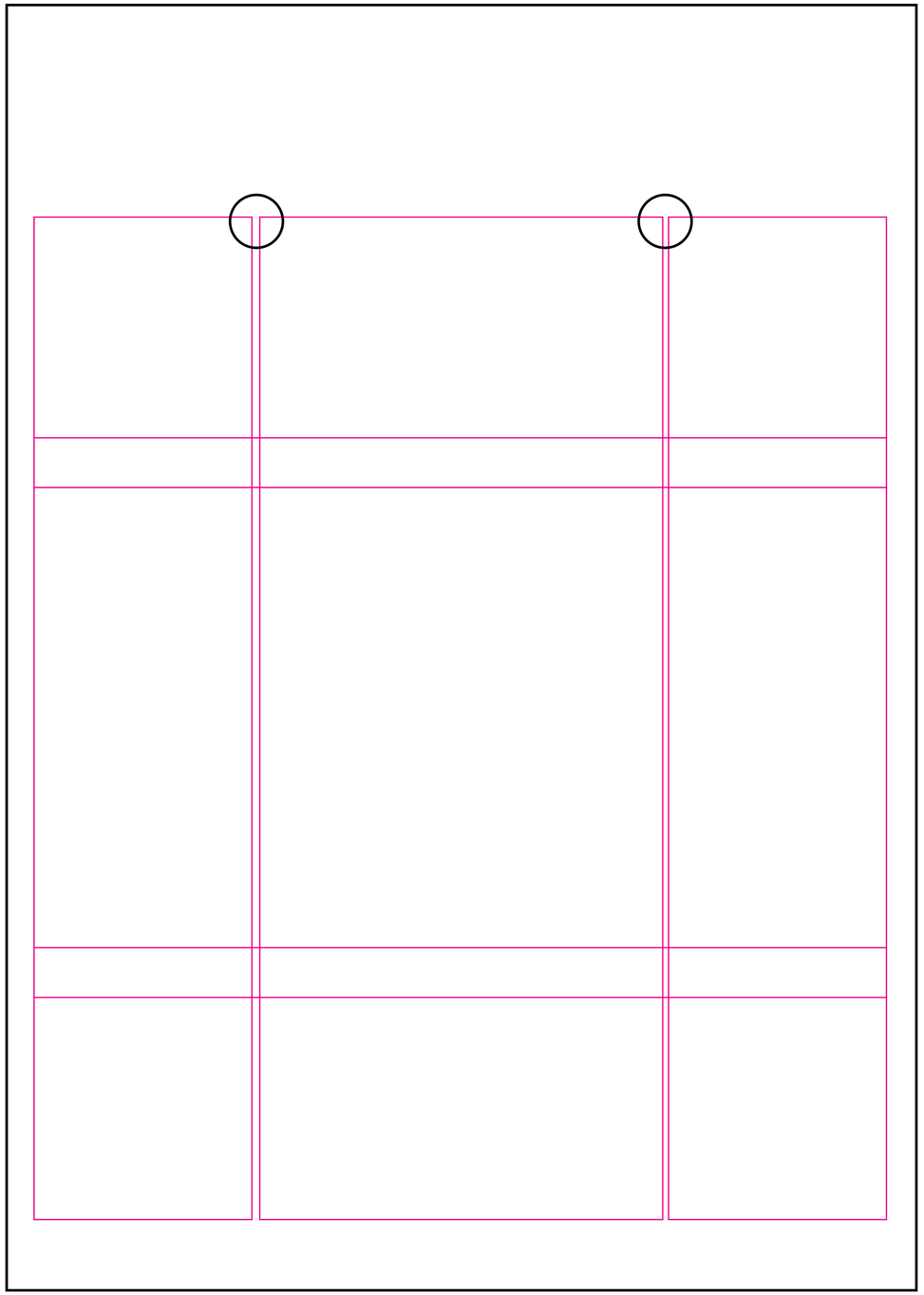
grid



Keeping elements within the grid

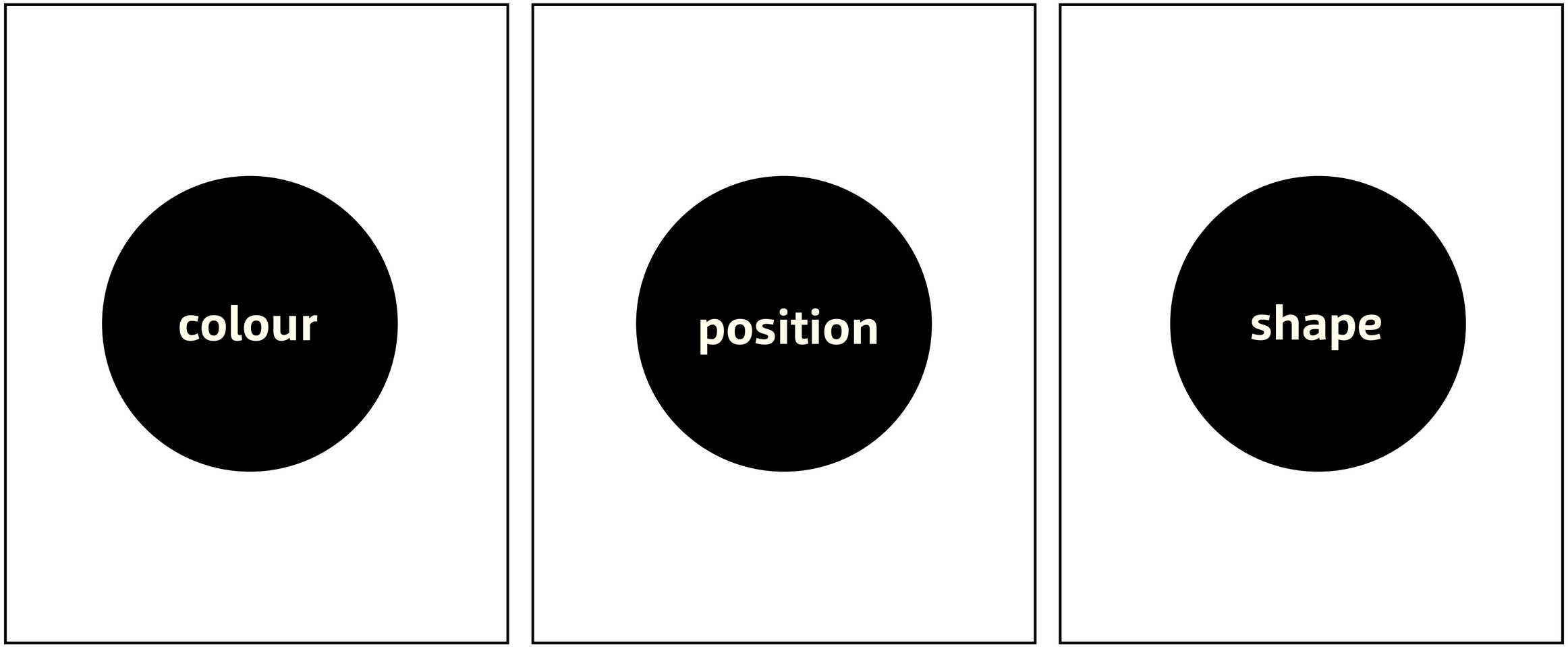
Case study
Unity

grid



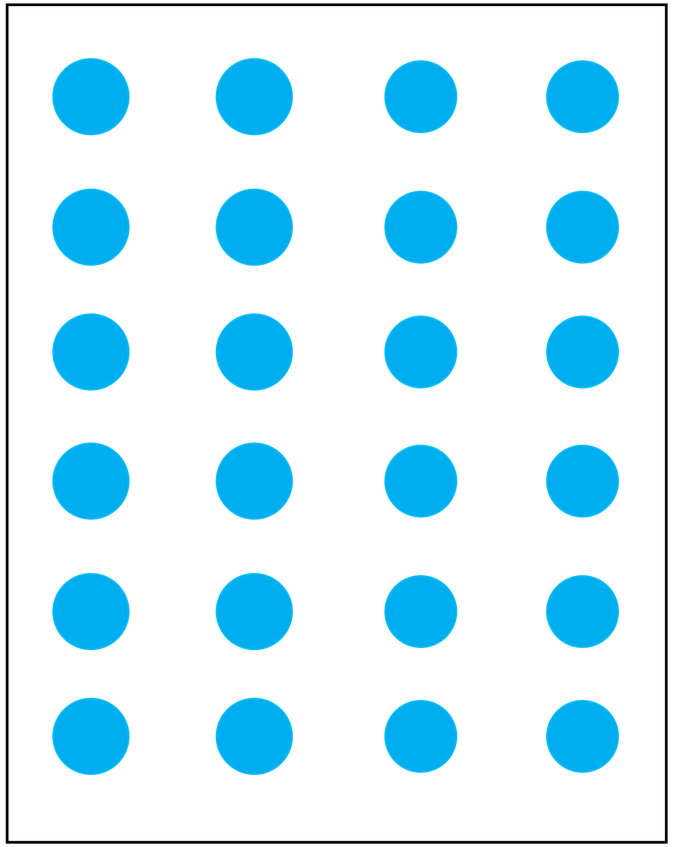
Connection & Disconnection

Connection and Disconnection

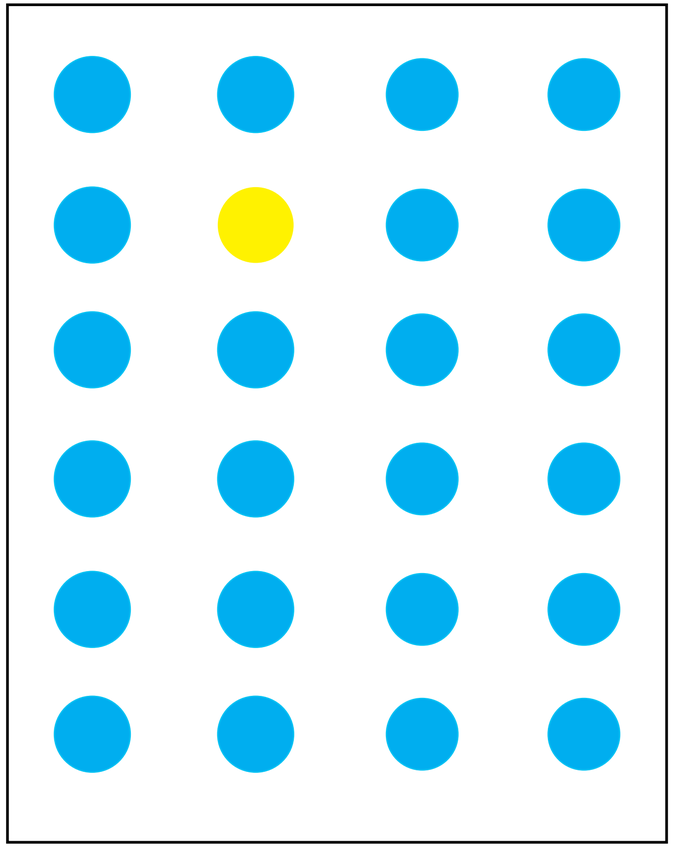


Connection and Disconnection
Colour

Elements with the same colours are perceived as one group



connection

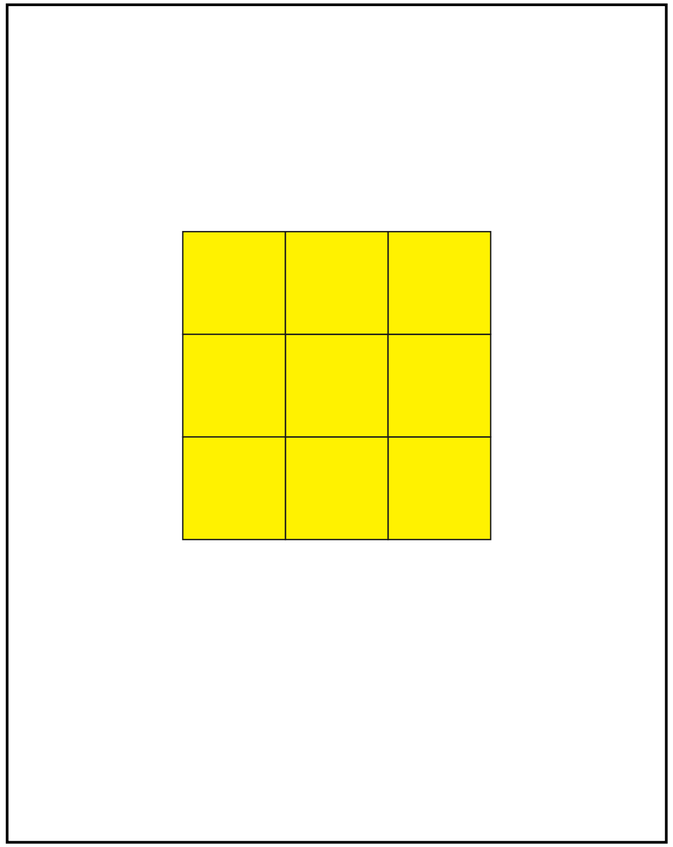


disconnection

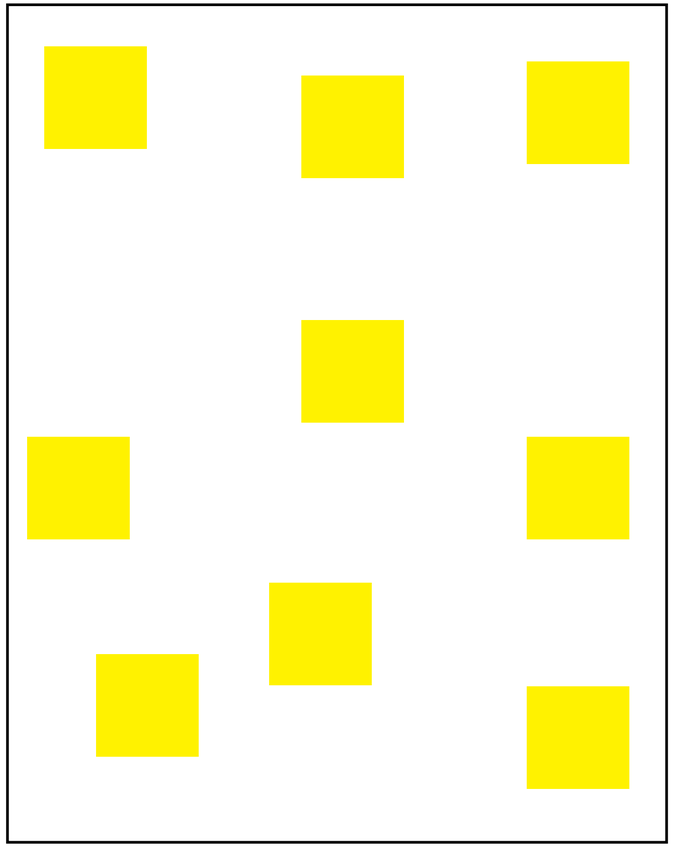
* GESTALT principles

Connection and Disconnection
Positioning

Closer elements relate together



one group

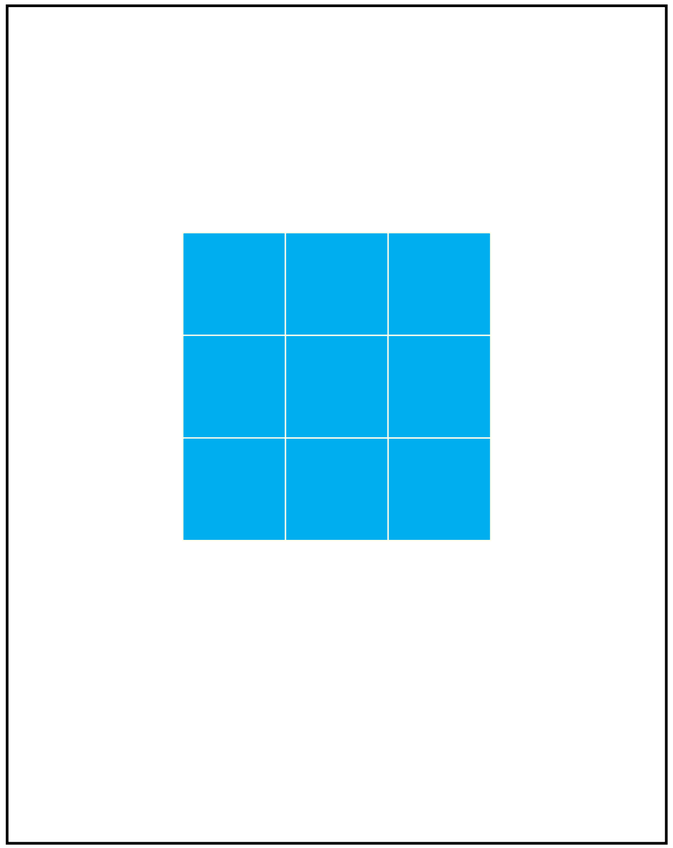


separete shapes

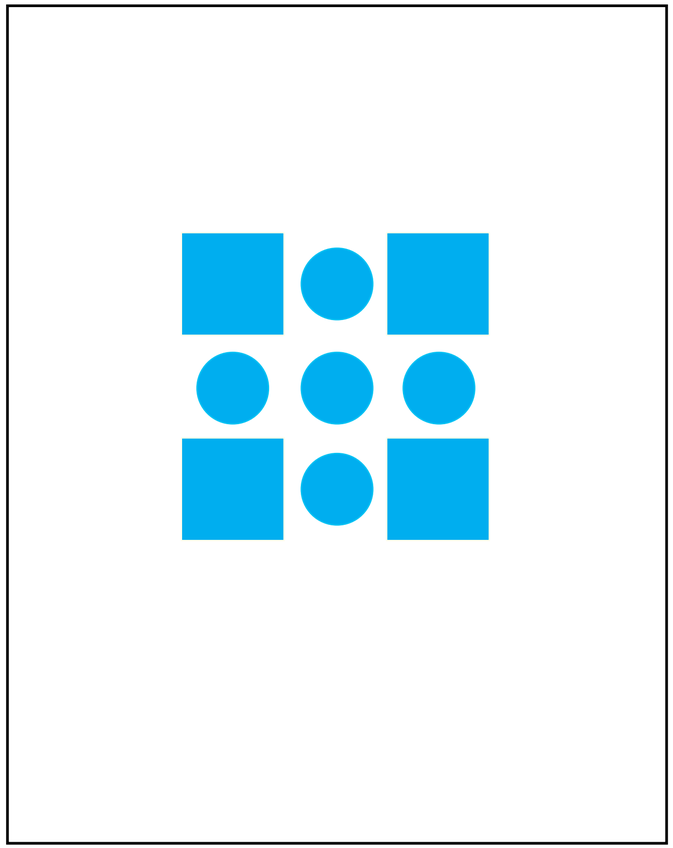
* GESTALT principles

Connection and Disconnection
Shape

Same shapes are perceived as a group



one group



different shapes

* GESTALT principles

Connection and Disconnection
Case study

disconnection

disconnection

CERIT SCIENTIFIC CLOUD

CERIT Scientific Cloud
Looking for Synergies in Scientific Computing

David Antoš, Aleš Křenek, Ivana Křenková, Luděk Matyska
Institute of Compt. Science, Masaryk University, Brno

Mission

CERIT Scietific Cloud centre, the successor of Supercomputing Centre Brno at Masaryk University, is a national centre providing flexible computational and storage capacities. Provision of these resources is complemented with extensive research activities, carried both in cooperation with the user communities and in the e-Infrastructure area itself.

History

Supercomputing Centre Brno (SCB) is a part of Institute of Compt. Science, Masaryk University. SCB was founded in 1994 as one of big supercomputing centres in the Czech Republic of that time. Similar cooperating centres were founded by other universities (Prague, Pilsen, Brno, Ostrava).

SCB has been working with Faculty of Informatics, Masaryk University, for a long time. The cooperation is both personal and factual, formally expressed, e.g., in a common research intent "Highly parallel and distributed computation systems".

Funding

Transformation of SCB into CERIT-SC will be supported by a project of the 3rd axis of the RD&I Operational Programme. The project will be realised from May 2011 to October 2013. Its overall budget is 5 MEur.

CERIT-SC is included in the **Roadmap for Large Research, Development and Innovation Infrastructures in the Czech Republic**.

Scientific director Prof. RNDr. Luděk Matyska, CSc.
Project manager Roman Čermák, M.Sc., MBA

http://www.cerit-sc.cz

Goals

CERIT-SC will **provide highly flexible computation environment** and primary **data storage capacities** for the national e-Infrastructure.

Research and development in CERIT-SC is focused on

- work with the users on tools and means for **efficient use** of the e-infrastructure by applications
- cooperation with the users in development, deployment, and operation of
  - new and modified systems and programs running in flexible computation environment
  - systems for storing, archiving, and retrieval of data
  - tools and protocols for data storage facilities interconnection, …

The research work will evolve in a **doctoral school** with student participation from both IT and application areas.

CERIT-SC will become an **important node of national e-Infrastructure**, including integration into the European Grid Infrastrucute. This will be achieved by tight cooperation with CESNET on development and adoption of appropriate standards.

Cooperation with Users

Deluge of experimental data is expected in near future. Many existing computational methods will **break or stop scaling**, new **developments** will be required.

User communities will come up with **interesting problems**, CERIT-SC will provide the necessary **IT expertise**. We expect formation of **joint teams**

- consisting of experts from both sides,
- addressing specific research areas – both ad-hoc and long term work,
- involving students (undergraduate and Ph.D.).

This work will result in **common publications**. Targeted projects are also expected.

Formal **agreement on future collaboration** (LoI):

- R&DI: AdMaS, BIOCEV, CEITEC, CzechGlobe, RECAMO
- cooperating institutions: IBA, MZK, Loschmidt Labs., RECETOX
- ESFRI projects (in negotiation): LINDAT-CLARIN, Euro-BioImaging

Flexible Resources

Provision of the resources will range from traditional **batch queues**, through **interactive access** upto the **cloud** paradigm. The resources will be provided free of charge.

Prioritization of the users will be based on their **scientific results**; resulting resource allocation will be achieved by technical means, combining advanced resource scheduling, virtualization, and the cloud paradigm; no complex administrative process will be required.

By careful ballancing the scheduling strategies, successful users will get better share while new users, students etc. will not be prevented from using the resources.

CERIT-SC computational resources are intended to serve **unexpected and unplanned requirements** of the users primarily.

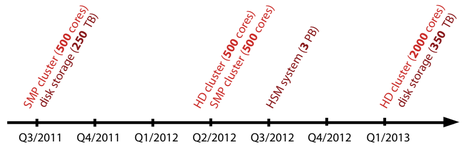
Data resources will serve to **store and share data** semipermanently and permanently. They will be tightly integrated with the computational resources. The target community are the **end-users** again.

Equipment and Purchase Schedule

The project will purchase the following resources:

- SMP – Symmetric MultiProcessing clusters, with more than 64 cores and 128 GB memory per node (1000 cores total)
- HD – High Density clusters with higher number of nodes with 8-16 cores and 16-32 GB memory (2500 cores total)
- HSM Hierarchical Storage Management (3 PB)
- disk storage (600 TB)
- development tools and application software

cores, capacities in current price/capacity ratios



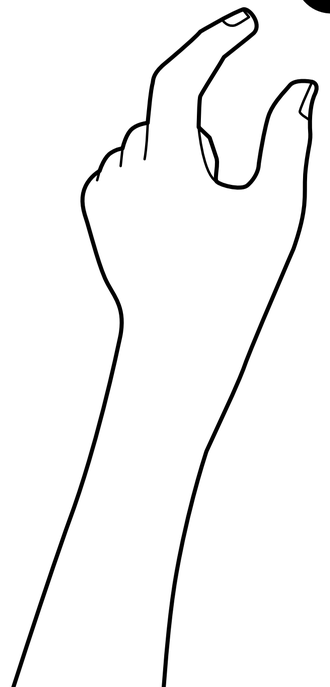
CERIT SCIENTIFIC CLOUD

This poster presentation is partially supported by project "Vzdělávání akademických pracovníků v oblasti eInfrastruktur (CZ.1.07/2.3.00/09.0074)"

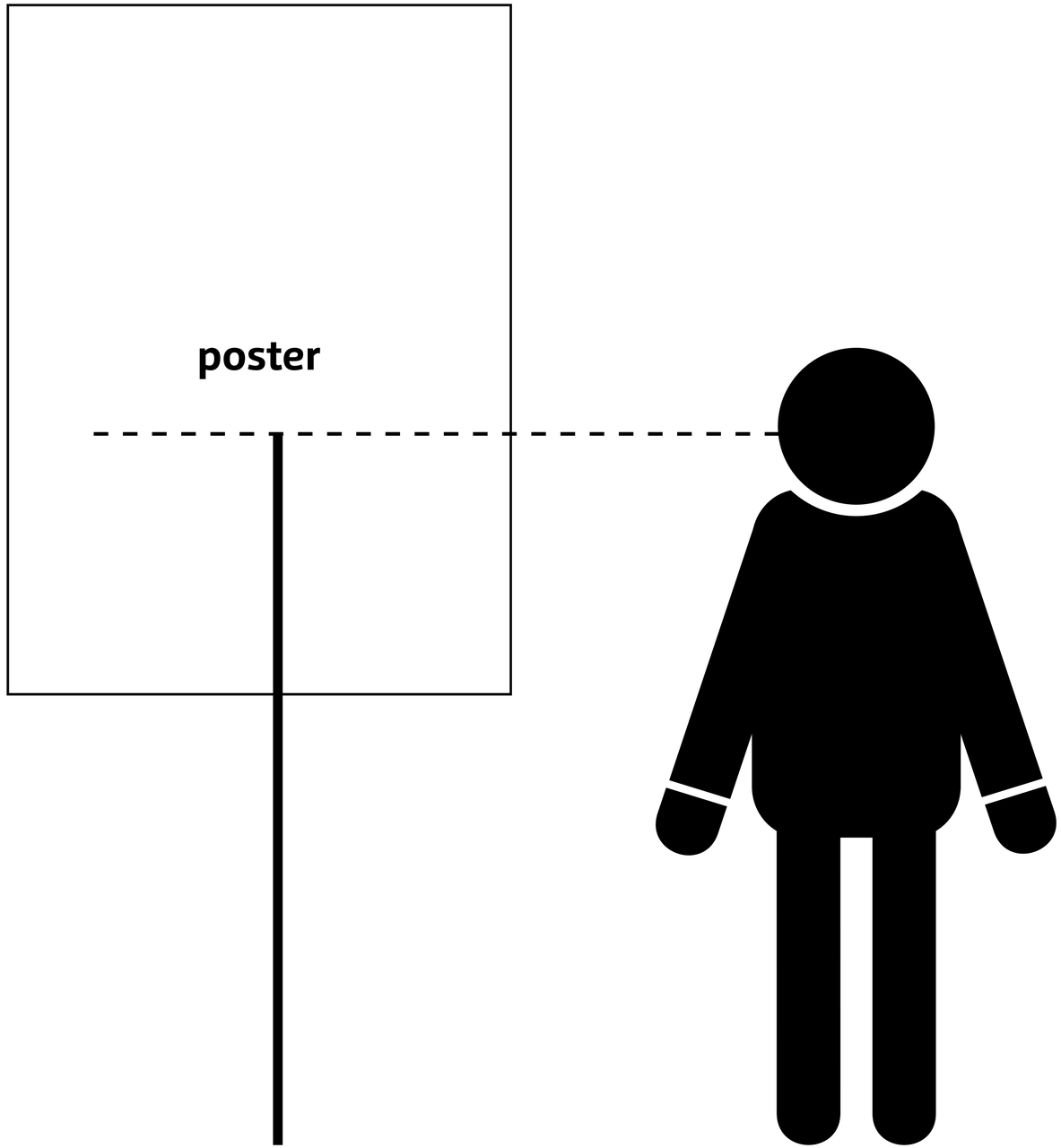
EUROPEAN UNION · esf · MINISTRY OF EDUCATION, YOUTH AND SPORTS · OP Education for Competitiveness

INVESTMENTS IN EDUCATION DEVELOPMENT

Usage

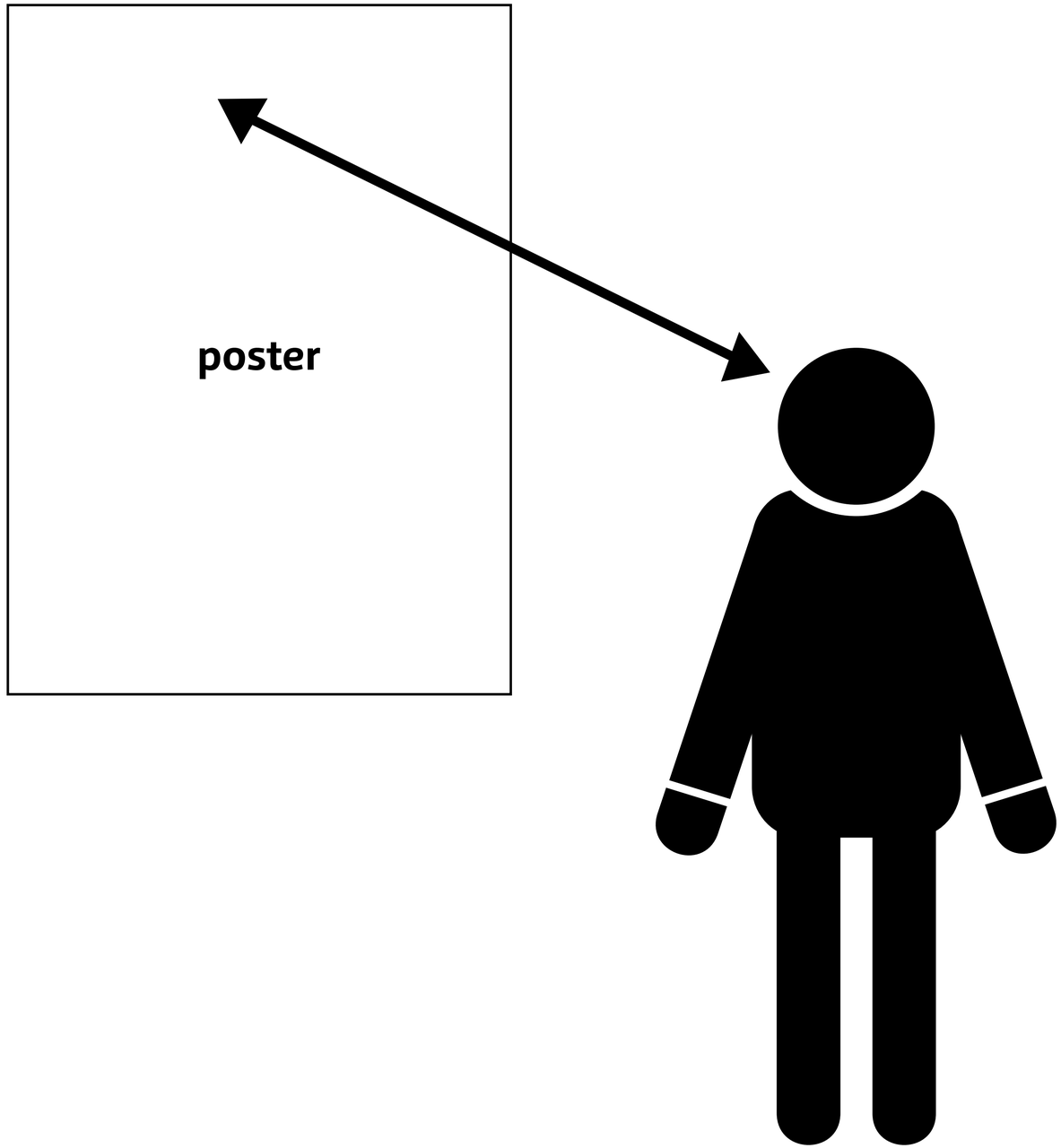


Usage



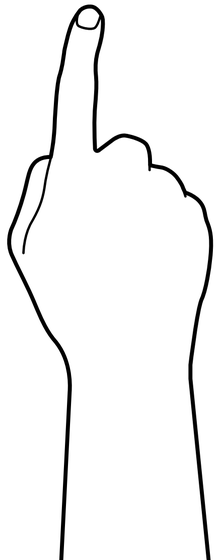
Position of the poster

Usage



Distance between medium

Ways of reading



Ways of reading
from left to right

Navigation

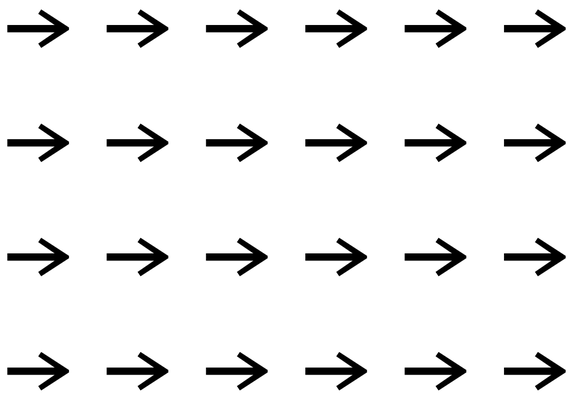
Position of elements, contrast, style of shapes could navigate user how to read the poster.

Input element

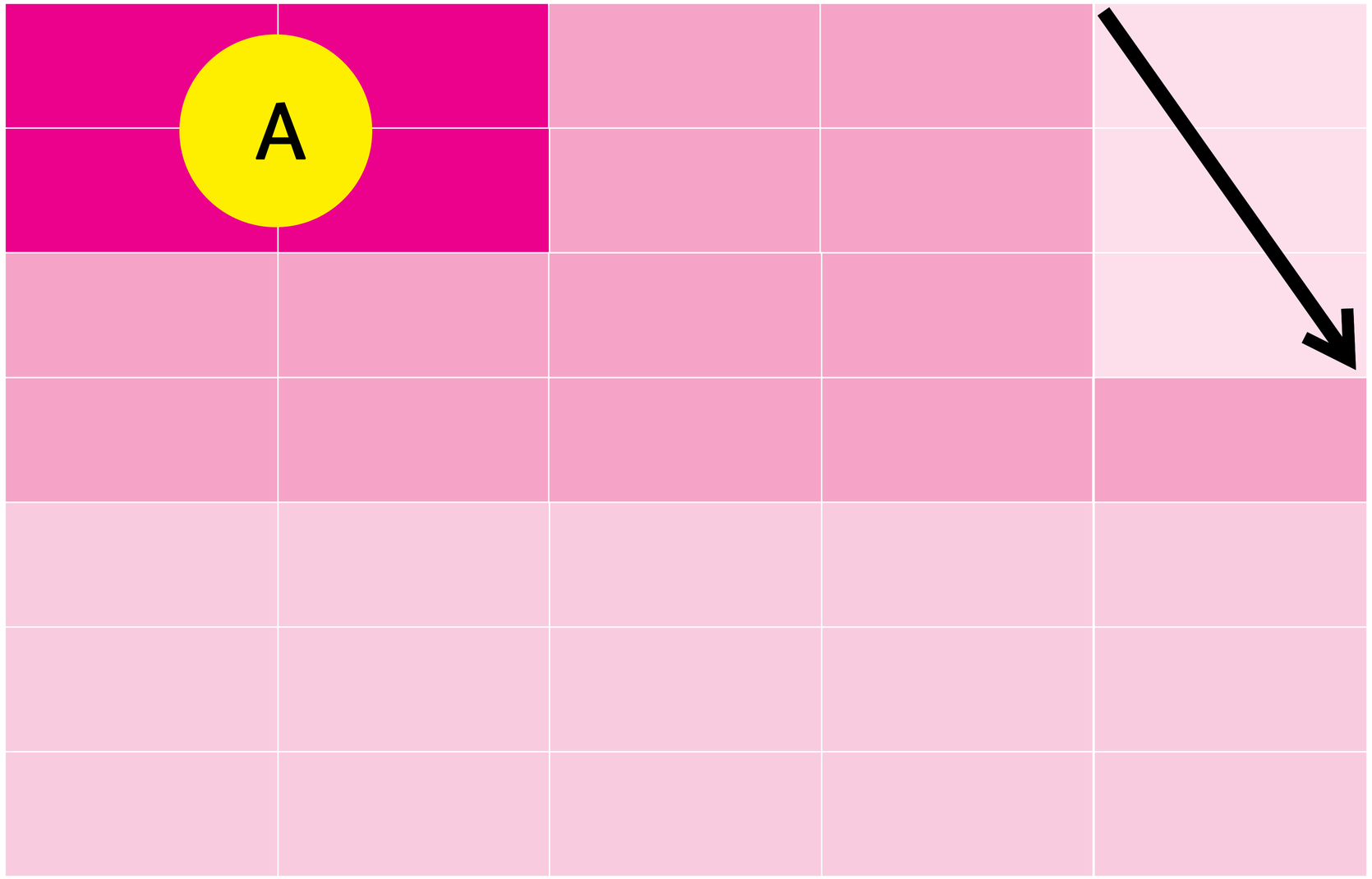
The element which should be read the first.

Colours and movents attracts attention

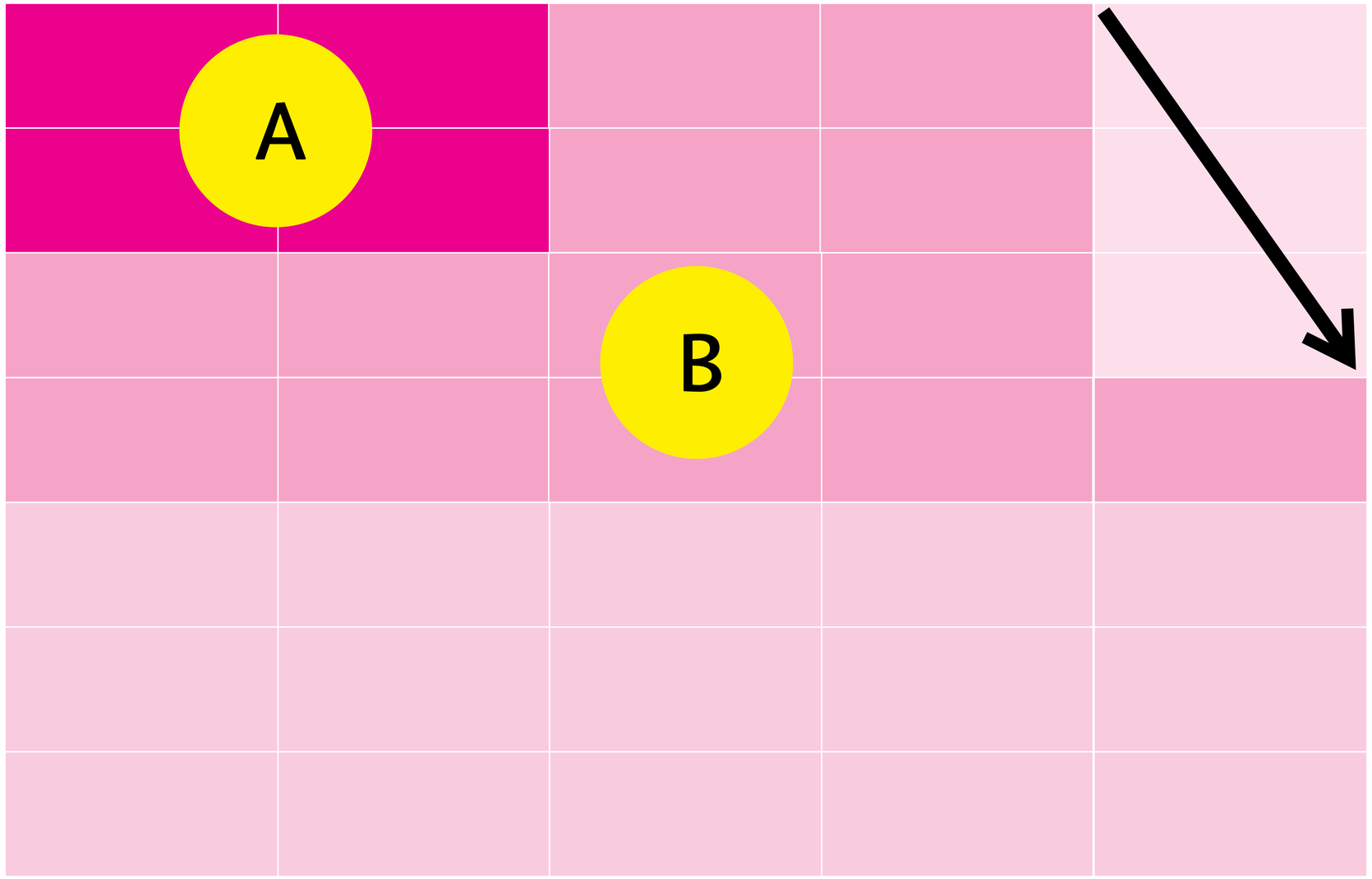
Latin – from left to right



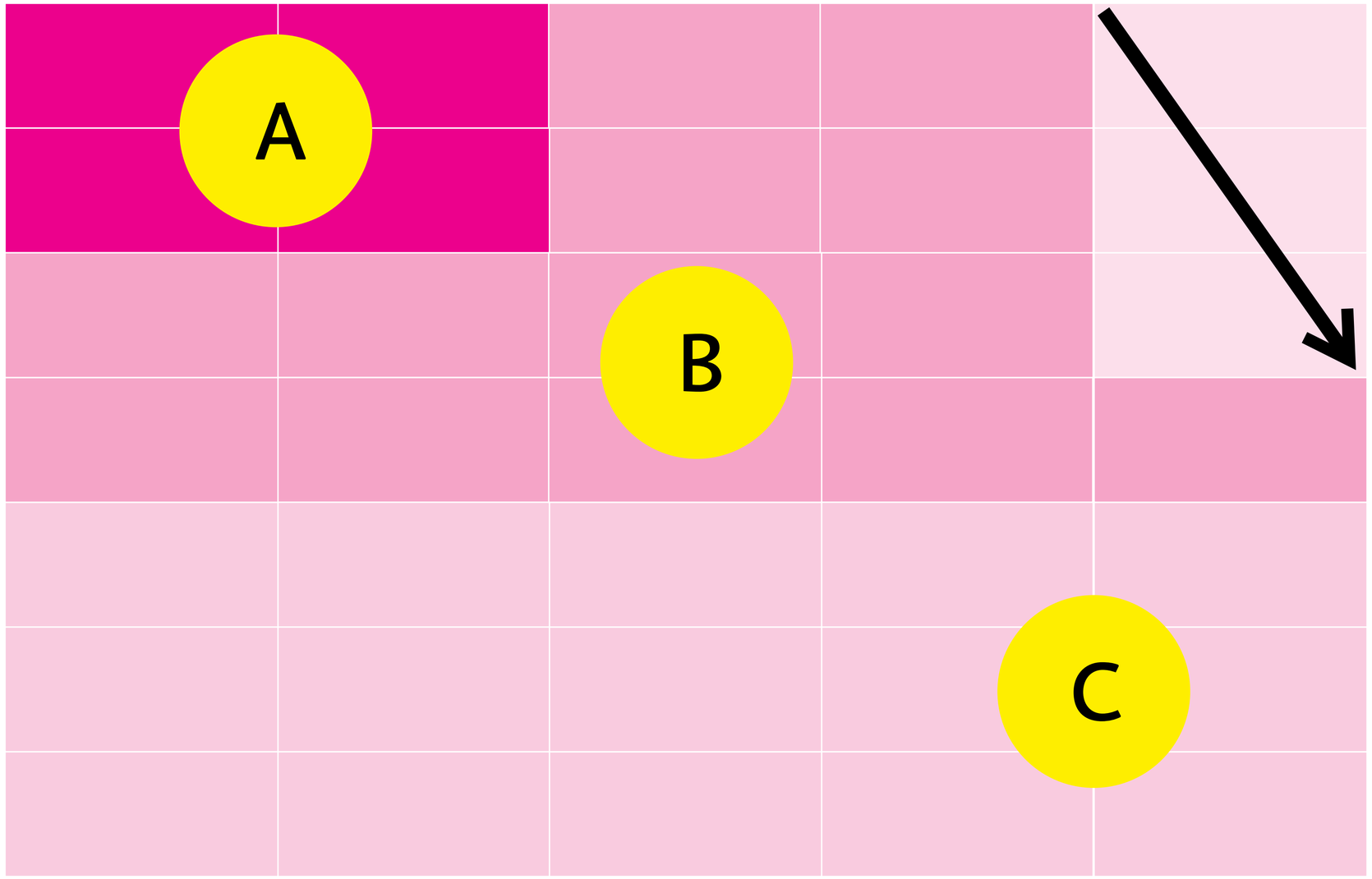
Ways of reading
from left to right



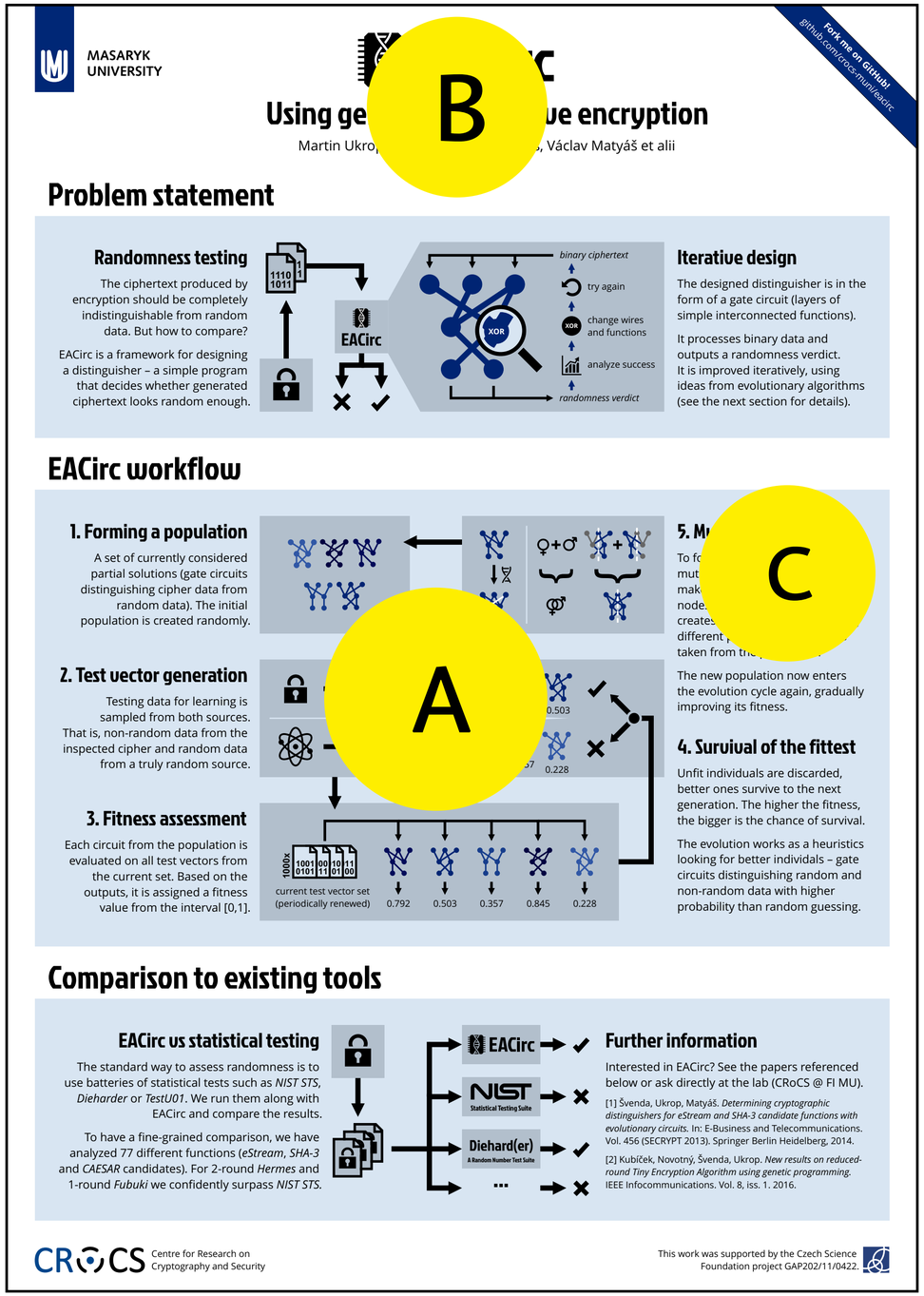
Ways of reading
from left to right



Ways of reading
from left to right



Ways of reading
Case study

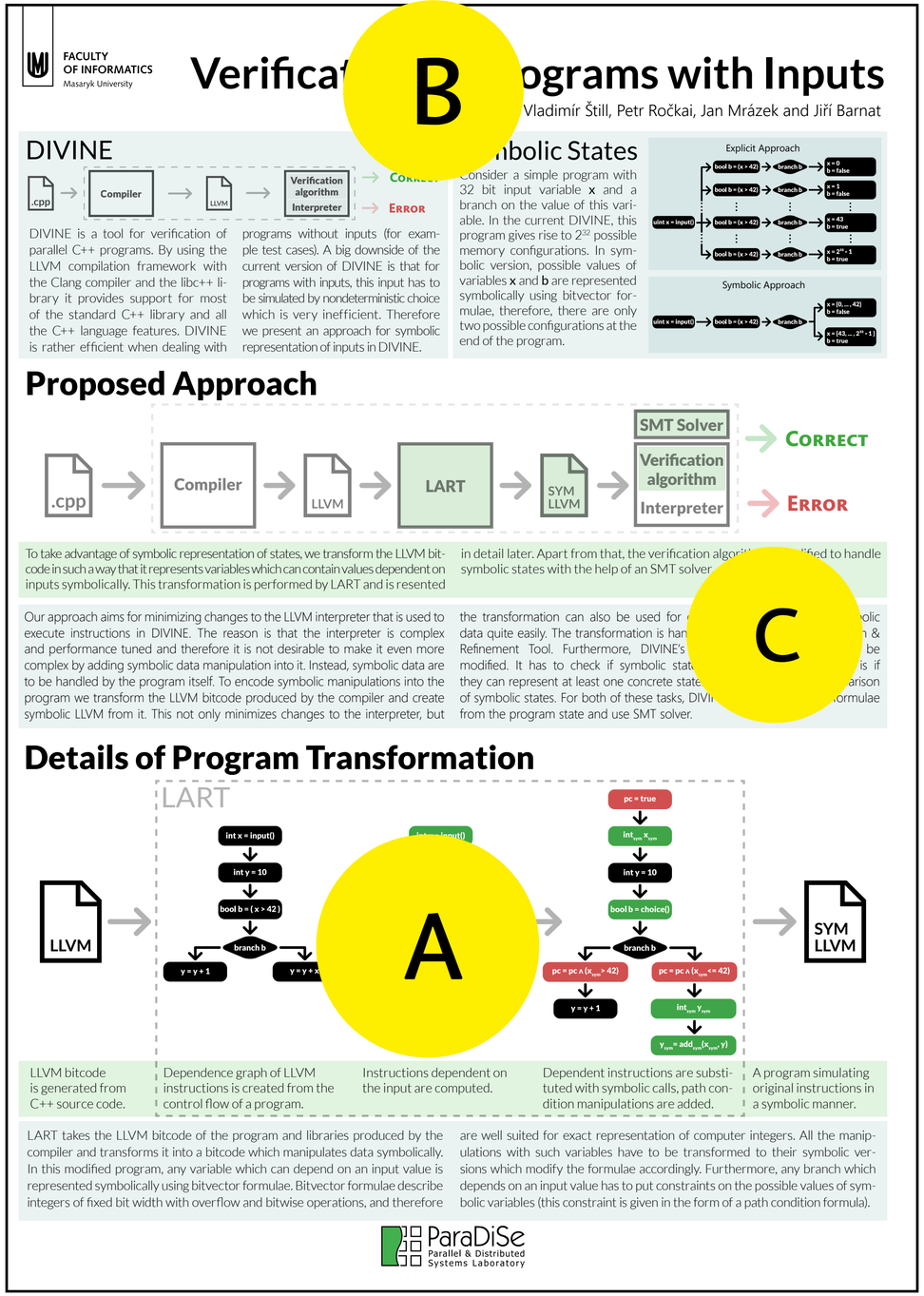


1. pictures – infographics

2. title

3. text

Ways of reading
Case study



1. pictures – infographics

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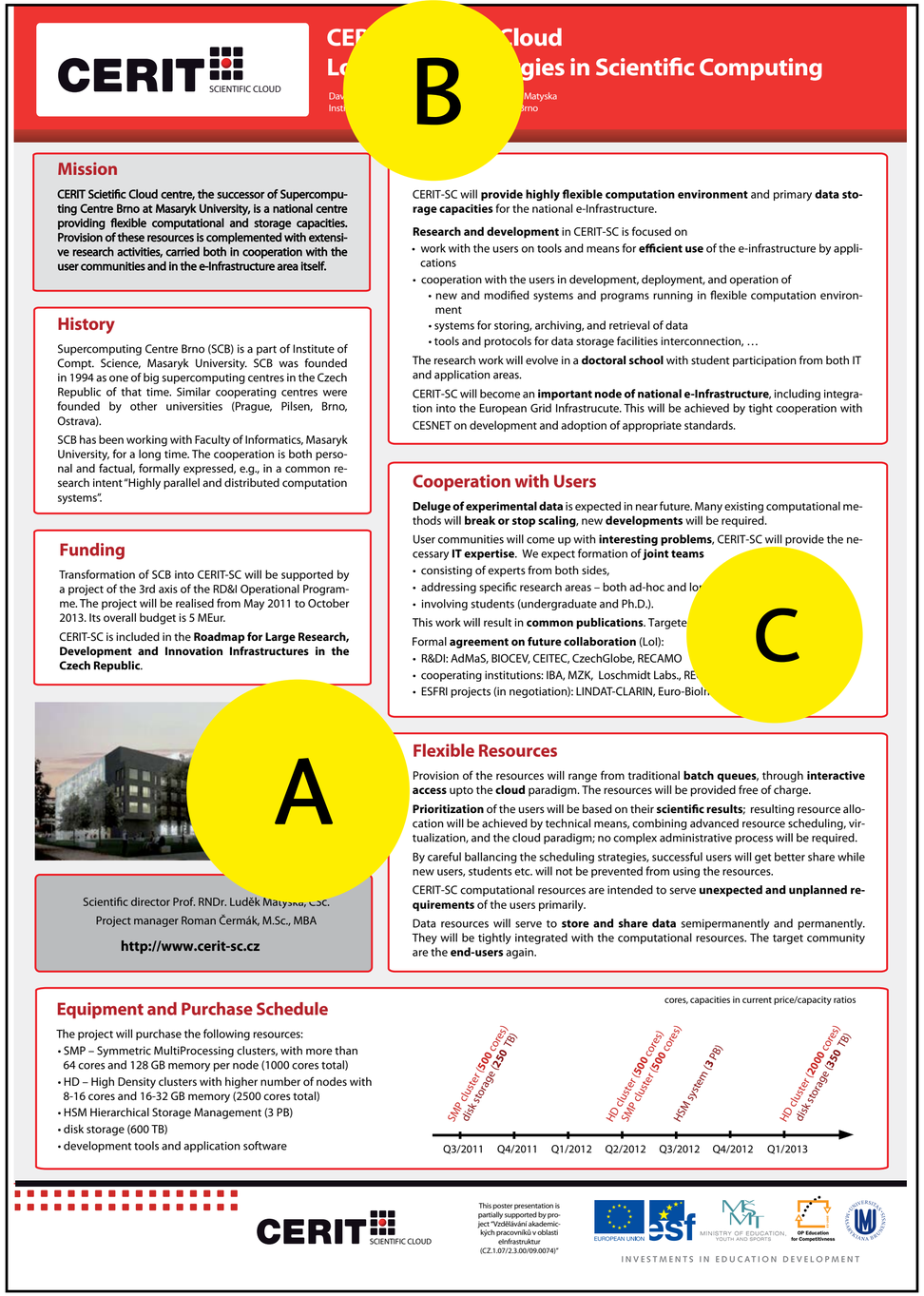
3. text

Ways of reading
Case study



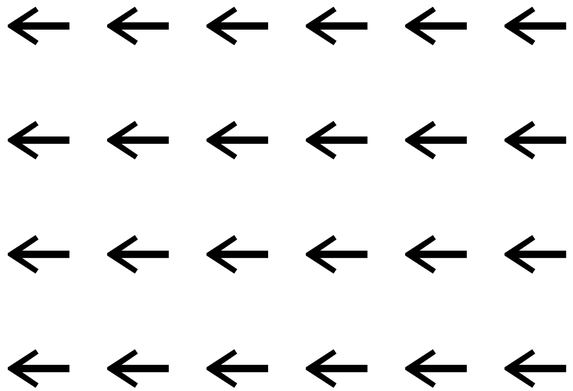
Function of image

1. pictures – infographics

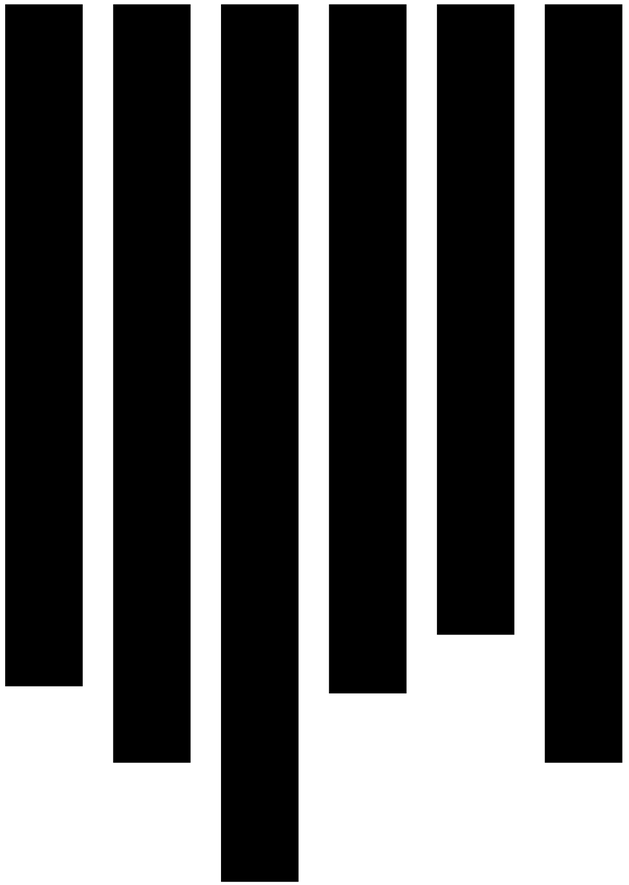
2. title

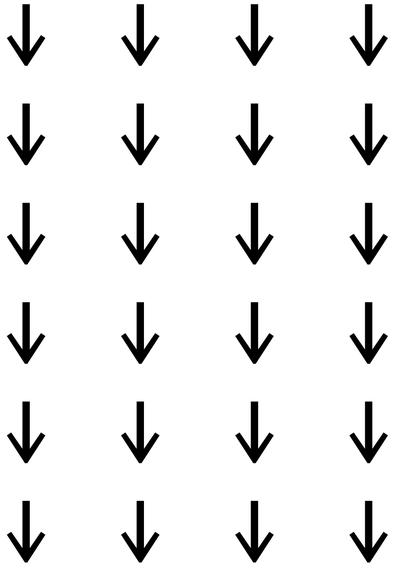
3. text

Arabic – from right to left



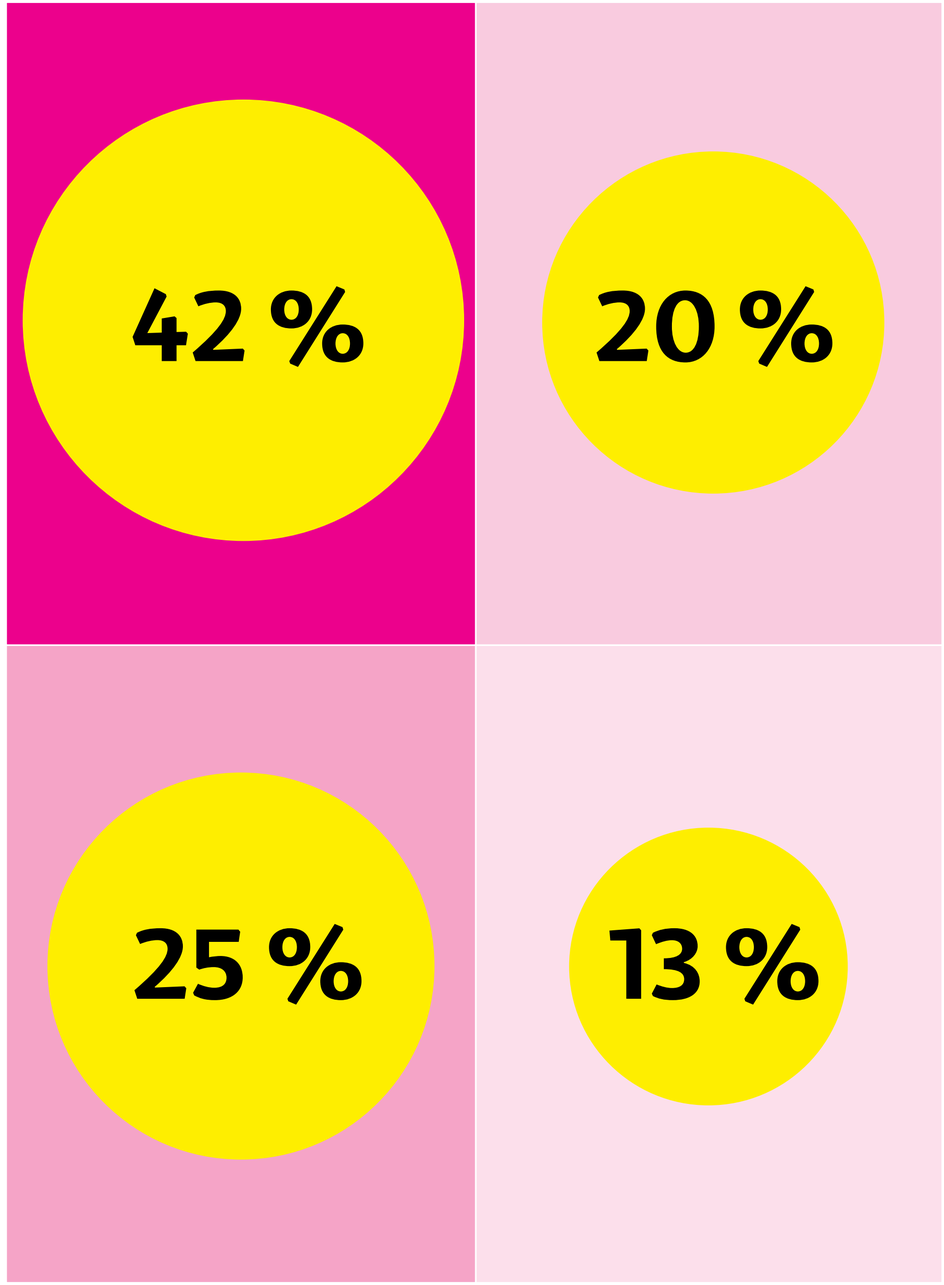
Chinese – ideograms from top to bottom





Ways of reading
from left to right

Percentual result of European reading.



Location of elements

The visual weight of an element attracts neighboring elements, imparting direction to them

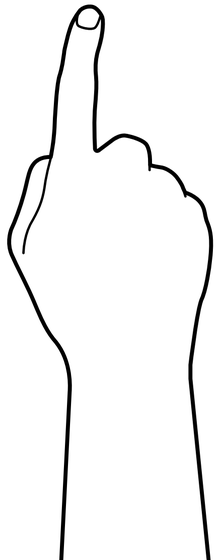
Shape of element

The shapes of an object creates an axis that imparts directional forces in two opposing directions along that axis

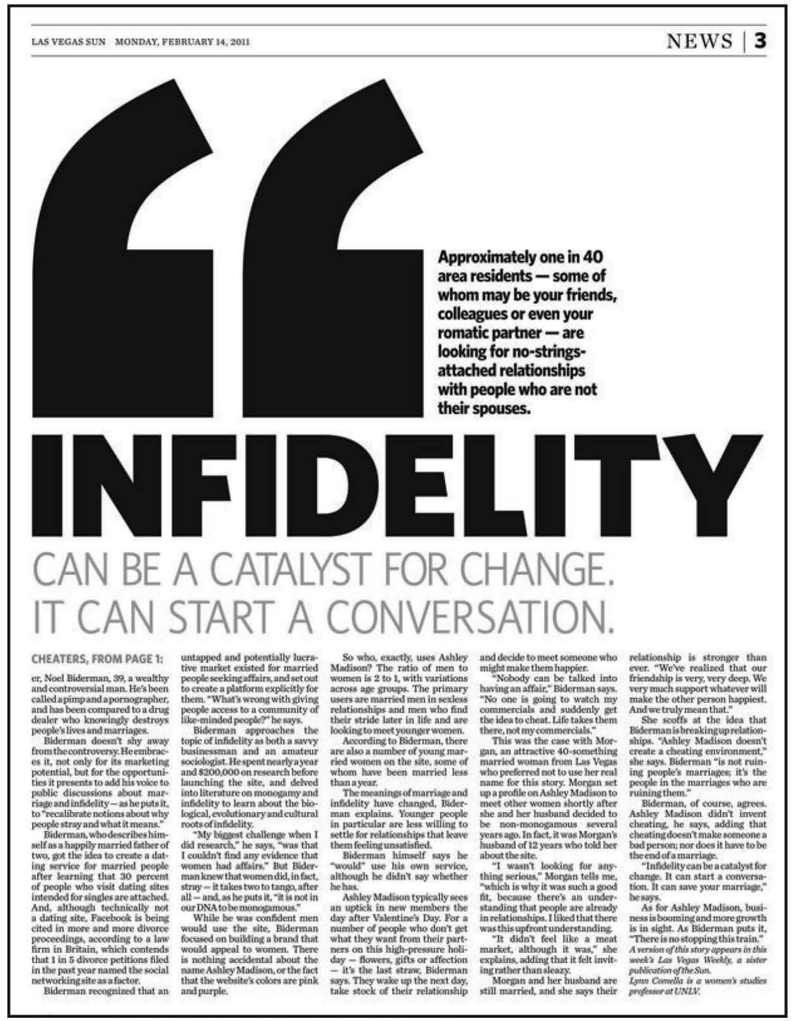
Subject matter of an element

Objects in a design may naturally point in a direction. For example an arrow.
Objects opposing the intrinsic directional forces of an object can impart visual direction to other elements in the composition

Visual elements and Hierarchy



Hierarchy



LAS VEGAS SUN MONDAY, FEBRUARY 14, 2011 NEWS | 3

Approximately one in 40 area residents — some of whom may be your friends, colleagues or even your romatic partner — are looking for no-strings-attached relationships with people who are not their spouses.

INFIDELITY

CAN BE A CATALYST FOR CHANGE. IT CAN START A CONVERSATION.

CHEATERS, FROM PAGE 1:

er, Noel Biderman, 39, a wealthy and controversial man. He's been called a pimp and a pornographer, and has been compared to a drug dealer who knowingly destroys people's lives and marriages.

Biderman doesn't shy away from the controversy. He embraces it, not only for its marketing potential, but for the opportunities it presents to add his voice to public discussions about marriage and infidelity — as he puts it, to "recalibrate notions about why people stray and what it means."

Biderman, who describes himself as a happily married father of two, got the idea to create a dating service for married people after learning that 30 percent of people who visit dating sites intended for singles are attached. And, although technically not a dating site, Facebook is being cited in more and more divorce proceedings, according to a law firm in Britain, which contends that 1 in 5 divorce petitions filed in the past year named the social networking site as a factor.

Biderman recognized that an untapped and potentially lucrative market existed for married people seeking affairs, and set out to create a platform explicitly for them. "What's wrong with giving people access to a community of like-minded people?" he says.

Biderman approaches the topic of infidelity as both a savvy businessman and an amateur sociologist. He spent nearly a year and $200,000 on research before launching the site, and delved into literature on monogamy and infidelity to learn about the biological, evolutionary and cultural roots of infidelity.

"My biggest challenge when I did research," he says, "was that I couldn't find any evidence that women had affairs." But Biderman knew that women did, in fact, stray — it takes two to tango, after all — and, as he puts it, "it is not in our DNA to be monogamous."

While he was confident men would use the site, Biderman focused on building a brand that would appeal to women. There is nothing accidental about the name Ashley Madison, or the fact that the website's colors are pink and purple.

So who, exactly, uses Ashley Madison? The ratio of men to women is 2 to 1, with variations across age groups. The primary users are married men in sexless relationships and men who find their stride later in life and are looking to meet younger women.

According to Biderman, there are also a number of young married women on the site, some of whom have been married less than a year.

The meanings of marriage and infidelity have changed, Biderman explains. Younger people in particular are less willing to settle for relationships that leave them feeling unsatisfied.

Biderman himself says he "would" use his own service, although he didn't say whether he has.

Ashley Madison typically sees an uptick in new members the day after Valentine's Day. For a number of people who don't get what they want from their partners on this high-pressure holiday — flowers, gifts or affection — it's the last straw, Biderman says. They wake up the next day, take stock of their relationship and decide to meet someone who might make them happier.

"Nobody can be talked into having an affair," Biderman says. "No one is going to watch my commercials and suddenly get the idea to cheat. Life takes them there, not my commercials."

This was the case with Morgan, an attractive 40-something married woman from Las Vegas who preferred not to use her real name for this story. Morgan set up a profile on Ashley Madison to meet other women shortly after she and her husband decided to be non-monogamous several years ago. In fact, it was Morgan's husband of 12 years who told her about the site.

"I wasn't looking for anything serious," Morgan tells me, "which is why it was such a good fit, because there's an understanding that people are already in relationships. I liked that there was this upfront understanding.

"It didn't feel like a meat market, although it was," she explains, adding that it felt inviting rather than sleazy.

Morgan and her husband are still married, and she says their relationship is stronger than ever. "We've realized that our friendship is very, very deep. We very much support whatever will make the other person happiest. And we truly mean that."

She scoffs at the idea that Biderman is breaking up relationships. "Ashley Madison doesn't create a cheating environment," she says. Biderman "is not ruining people's marriages; it's the people in the marriages who are ruining them."

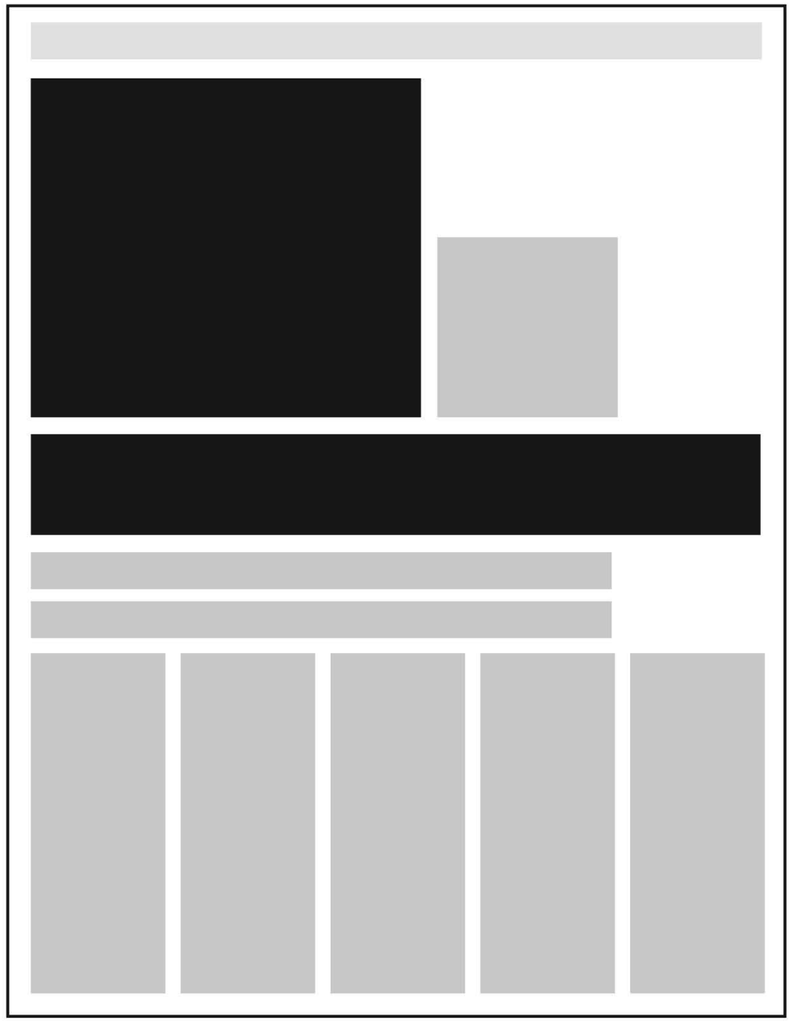
Biderman, of course, agrees. Ashley Madison didn't invent cheating, he says, adding that cheating doesn't make someone a bad person; nor does it have to be the end of a marriage.

"Infidelity can be a catalyst for change. It can start a conversation. It can save your marriage," he says.

As for Ashley Madison, business is booming and more growth is in sight. As Biderman puts it, "There is no stopping this train."

A version of this story appears in this week's Las Vegas Weekly, a sister publication of the Sun.

Lynn Comella is a women's studies professor at UNLV.



HIERARCHY:

visual elemenets composed in a logical sequence

crucial elements in contrast with elements with less importance

layering of elements according to their importance

position of elements leads the way how the image is to be read

TYPOGRAPHIC HIERARCHY:

highlighting various information and its importance

working with different size of font

working with various weights of font

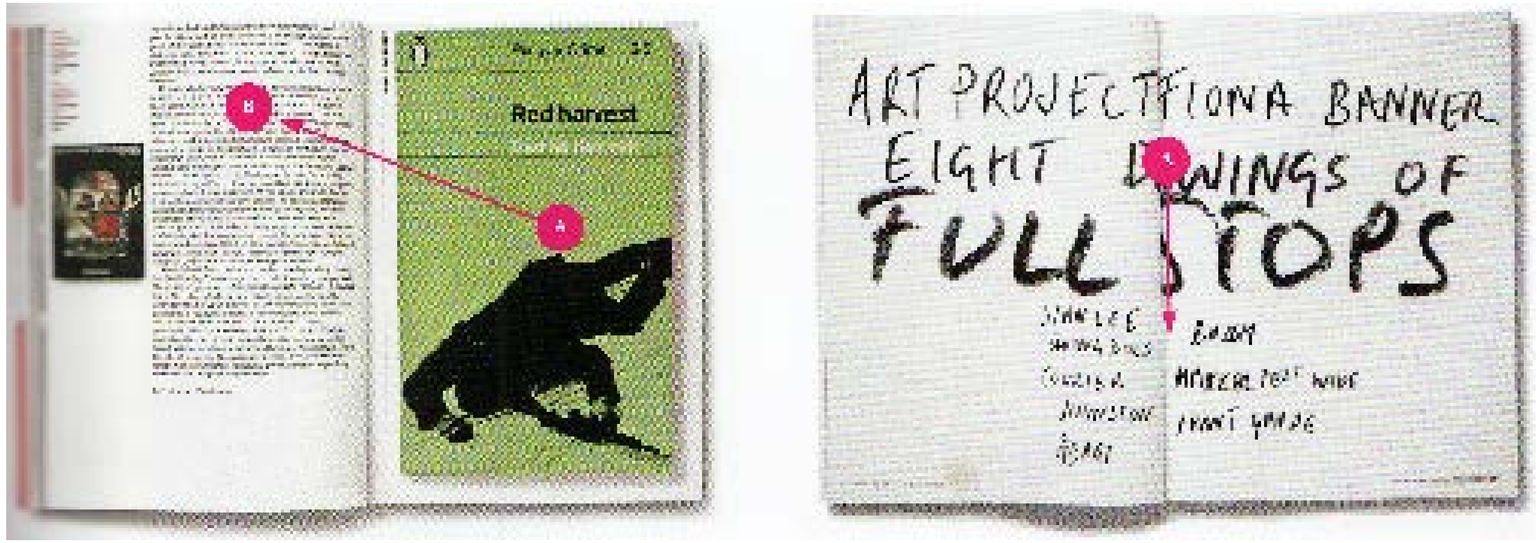
Hierarchy

Hierarchy

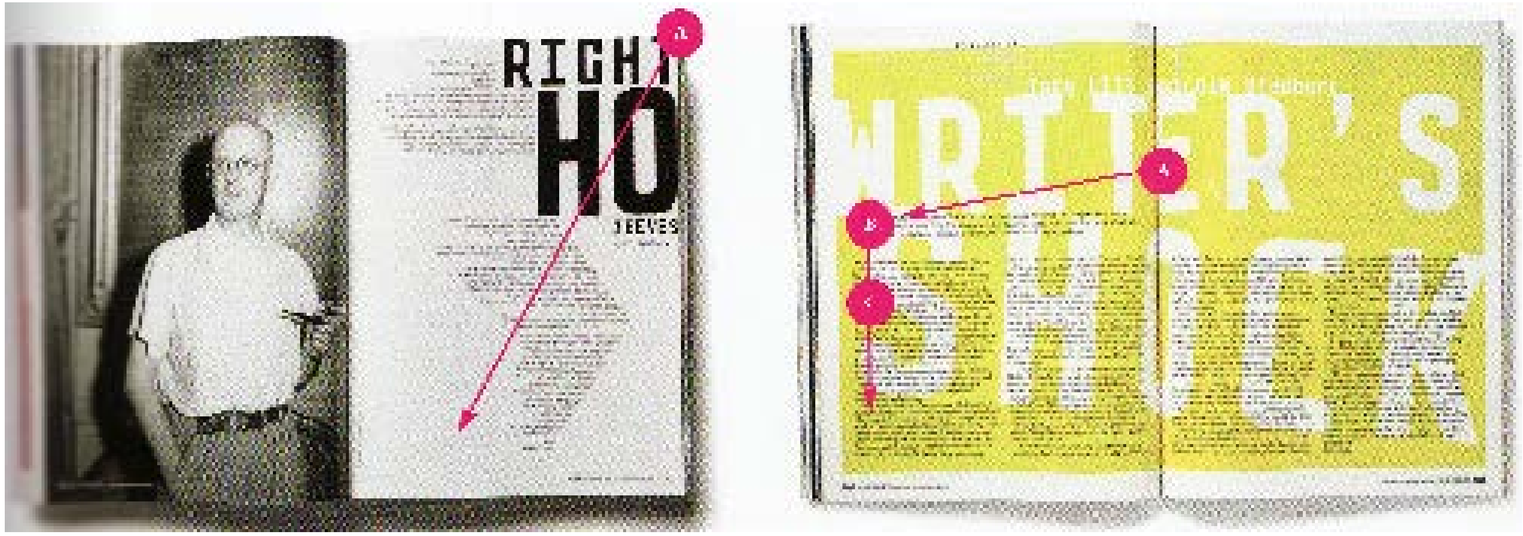
good *for* profits

Corporate Social Responsibility is high on the contemporary business agenda. And rightly so: through their activities, products and services, companies have a strong impact on our society and environment – and hence on our quality of life, both now and in the future. That creates a costly duty of care. So how do you live up to that responsibility day in, day out?

Hierarchy

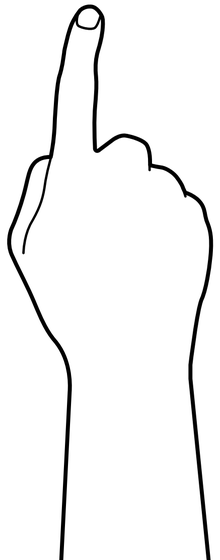

B
A
Redhorest
ART PROJECTFIONA BANNER
EIGHT
WINGS OF
FULL STOPS

Hierarchy



Hierarchy

Ogilvy's way of reading posters



HOW WE LOOK AT A POSTER

OGILVY:

illustration > upper element

title > above the illustration

text > above the title

Ogilvy

Ogilvy

Think small.

Our little car isn't so much of a novelty any more.

A couple of dozen college kids don't try to squeeze inside it.

The guy at the gas station doesn't ask where the gas goes.

Nobody even stares at our shape.

In fact, some people who drive our little flivver don't even think 32 miles to the gallon is going any great guns.

Or using five pints of oil instead of five quarts.

Or never needing anti-freeze.

Or racking up 40,000 miles on a set of tires.

That's because once you get used to some of our economies, you don't even think about them any more.

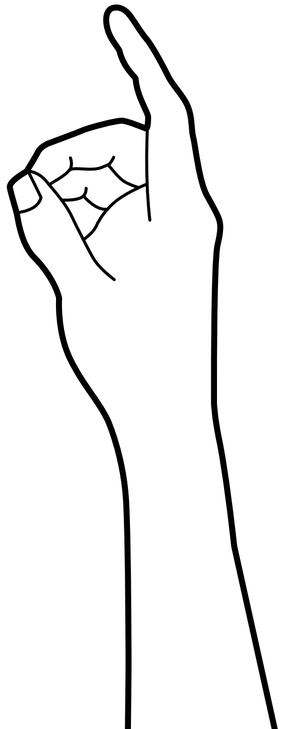
Except when you squeeze into a small parking spot. Or renew your small insurance. Or pay a small repair bill.

Or trade in your old VW for a new one.

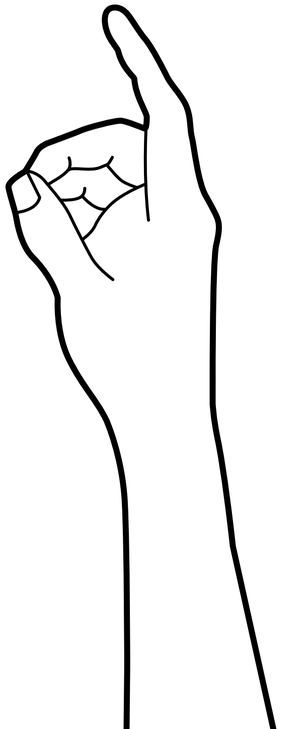
Think it over.

Typography

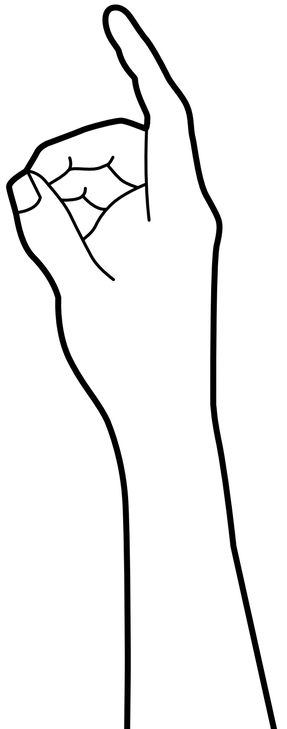
Font style



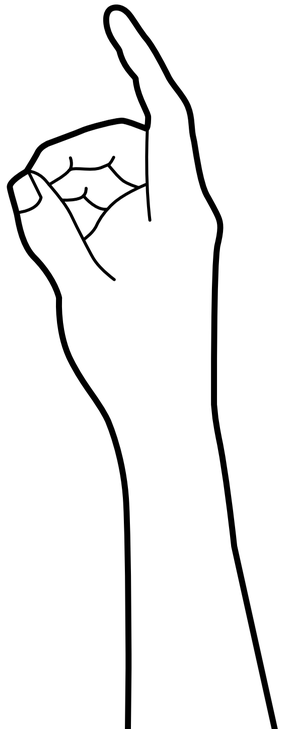
Font family



Font weights



Setting of text boxes



DIVINE is a tool for verification of parallel C++ programs. By using the LLVM compilation framework with the Clang compiler and the libc++ library it provides support for most of the standard C++ library and all the C++ language features. DIVINE is rather efficient when dealing with programs without inputs (for example test cases). A big downside of the current version of DIVINE is that for programs with inputs, this input has to be simulated by nondeterministic choice which is very inefficient. Therefore we present an approach for symbolic representation of inputs in DIVINE.

left alignment

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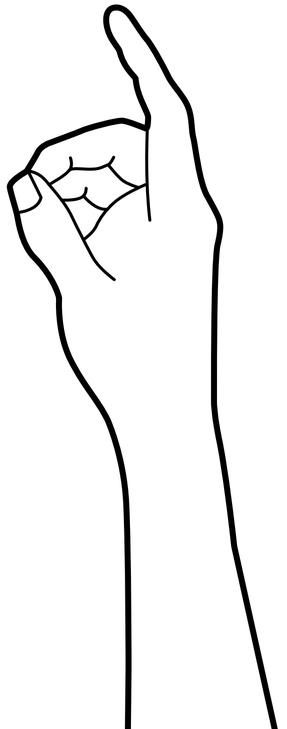
left justify alignment

Setting of text boxes



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alignment

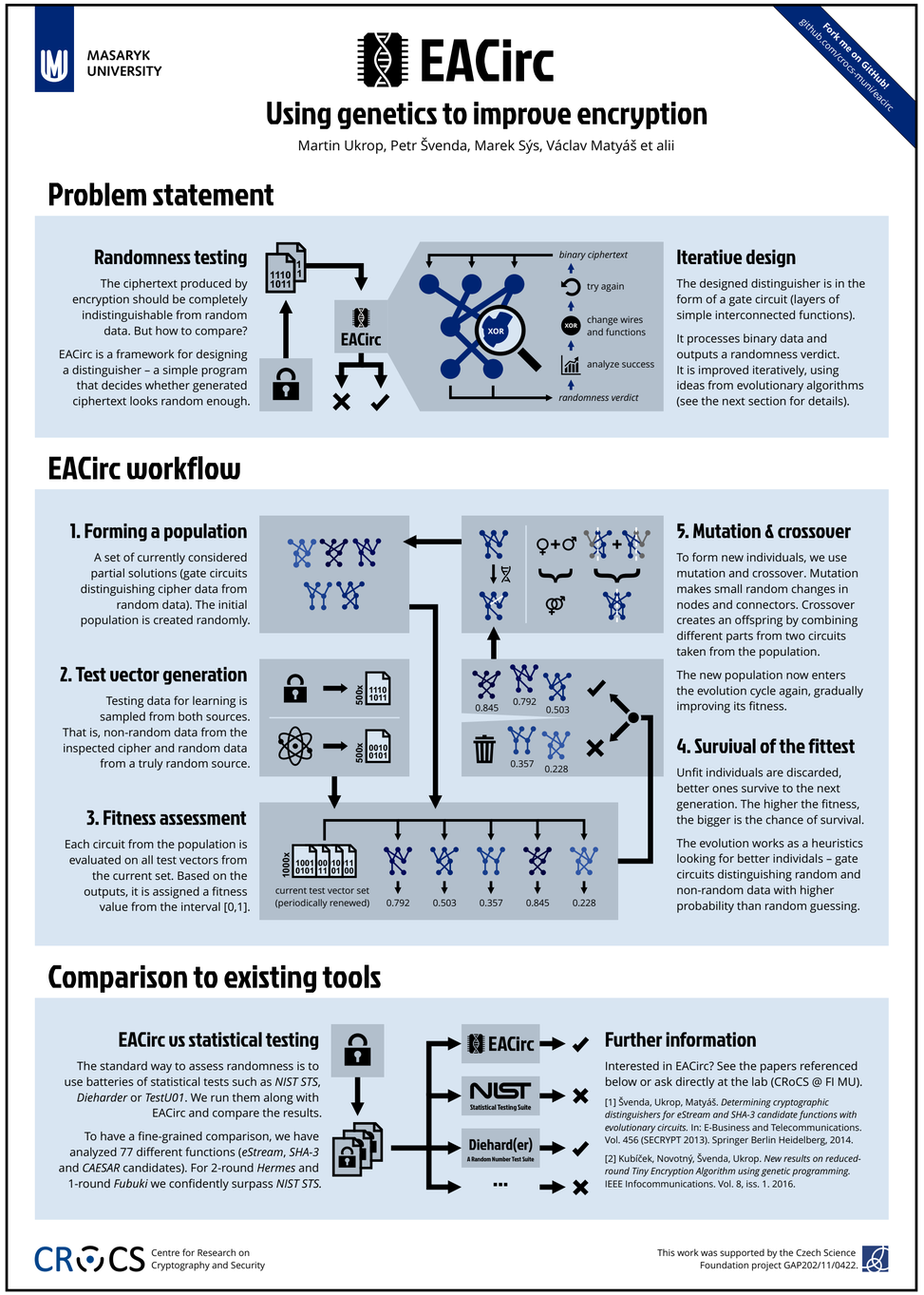
width of a text box

font size

leading

Case study
Typography

left alignment



MASARYK UNIVERSITY

EACirc

Using genetics to improve encryption

Martin Ukrop, Petr Švenda, Marek Sýs, Václav Matyáš et alii

Fork me on GitHub! github.com/crocs-muni/eacirc

Problem statement

Randomness testing

The ciphertext produced by encryption should be completely indistinguishable from random data. But how to compare?

EACirc is a framework for designing a distinguisher – a simple program that decides whether generated ciphertext looks random enough.

binary ciphertext
try again
change wires and functions
analyze success
randomness verdict

Iterative design

The designed distinguisher is in the form of a gate circuit (layers of simple interconnected functions).

It processes binary data and outputs a randomness verdict. It is improved iteratively, using ideas from evolutionary algorithms (see the next section for details).

EACirc workflow

1. Forming a population

A set of currently considered partial solutions (gate circuits distinguishing cipher data from random data). The initial population is created randomly.

2. Test vector generation

Testing data for learning is sampled from both sources. That is, non-random data from the inspected cipher and random data from a truly random source.

500x 1110 1011

500x 0010 0101

3. Fitness assessment

Each circuit from the population is evaluated on all test vectors from the current set. Based on the outputs, it is assigned a fitness value from the interval [0,1].

1000x 1001 0101 00 11 10 01 11 00

current test vector set (periodically renewed)

0.792 0.503 0.357 0.845 0.228

5. Mutation & crossover

To form new individuals, we use mutation and crossover. Mutation makes small random changes in nodes and connectors. Crossover creates an offspring by combining different parts from two circuits taken from the population.

The new population now enters the evolution cycle again, gradually improving its fitness.

4. Survival of the fittest

Unfit individuals are discarded, better ones survive to the next generation. The higher the fitness, the bigger is the chance of survival.

The evolution works as a heuristics looking for better individuals – gate circuits distinguishing random and non-random data with higher probability than random guessing.

Comparison to existing tools

EACirc vs statistical testing

The standard way to assess randomness is to use batteries of statistical tests such as *NIST STS*, *Dieharder* or *TestU01*. We run them along with EACirc and compare the results.

To have a fine-grained comparison, we have analyzed 77 different functions (*eStream*, *SHA-3* and *CAESAR* candidates). For 2-round *Hermes* and 1-round *Fubuki* we confidently surpass *NIST STS*.

EACirc ✓
NIST Statistical Testing Suite ✗
Diehard(er) A Random Number Test Suite ✓
... ✗

Further information

Interested in EACirc? See the papers referenced below or ask directly at the lab (CRoCS @ FI MU).

[1] Švenda, Ukrop, Matyáš. *Determining cryptographic distinguishers for eStream and SHA-3 candidate functions with evolutionary circuits.* In: E-Business and Telecommunications. Vol. 456 (SECRYPT 2013). Springer Berlin Heidelberg, 2014.

[2] Kubíček, Novotný, Švenda, Ukrop. *New results on reduced-round Tiny Encryption Algorithm using genetic programming.* IEEE Infocommunications. Vol. 8, iss. 1. 2016.

CROCS Centre for Research on Cryptography and Security

This work was supported by the Czech Science Foundation project GAP202/11/0422.

Left alignment keeps same gaps between words

Black text on a white background allows common speed reading.

Black text on a white background allows common speed of reading.

White text on black background reduces reading process of 15 %.

White text on black background is optically thicker.

Text in Italics reduces redability of 15 %.

LONGER UPPERCASE TEXT REDUCES REDABILITY OF 15 %

TEXT
Left alignment doesn't have any affect on speed of reading.
Left alignment doesn't have any affect on speed of reading.

TEXT
Left justify alignment doesn't have any affect on speed of reading. Left justify alignment doesn't have any affect on speed of reading.

Typography and errors

A TYPOGRAPHIC RIVERS

Dr. Jozef Ferenczy učil celé generácie študentov a nitrianske gymnázium malo aj jeho zásluhou veľmi dobré meno. Okrem Karola Pongrácza k jeho žiakom patril okrem iných i maliar Maximilián Schurmann (1890 – 1960).

gaps in typesetting, which appear to run through a paragraph of text, due to a coincidental alignment of spaces

spaces caused by full text justification or monospaced fonts

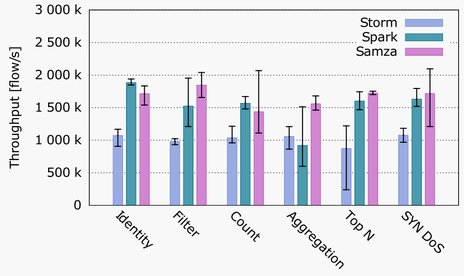
no hyphenation

Case study
Typography

left justify alignment

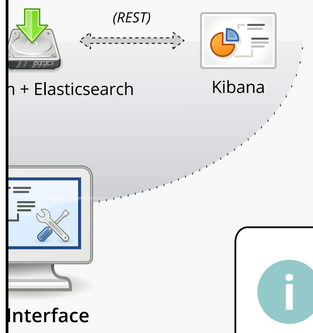
Left alignment keeps same gaps between words

Systems Performance Benchmark — Four Nodes (32 vCPUs)



- Samza and Spark have a high-enough flow throughput and can be used for the analysis of data from multiple networks at the same time.
- Apache Spark system has been chosen as it offers an easy management and a high versatility in terms of the running environment and proprietary processing methods (e.g., sliding window).

typographic rivers

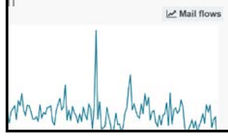


The demonstration cluster consists of 7 virtual machines, one is dedicated to IPFIXcol, 5 to Spark and one to the Kibana and Web server. The following configuration is the same for all machines:

- (4 vCPUs) Intel(R) Xeon(R) CPU E5-2680 0 @ 2.70GHz,
- 8GB 1600MMHz DIMM DRAM EDO,
- 85GB SCSI Disk with 53c1030 PCI-X Fusion-MPT Dual Ultra320 SCSI,
- 10 Gbit/s network connection, 1 Gbit/s virtual NICs.

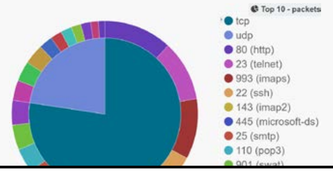
IPFIXcol is a flexible IPFIX flow data collector designed to be easily extensible by plugins. In our demonstration, we use only part of its wide functionality – data acquisition from multiple network probes and their transformation into a JSON data stream.

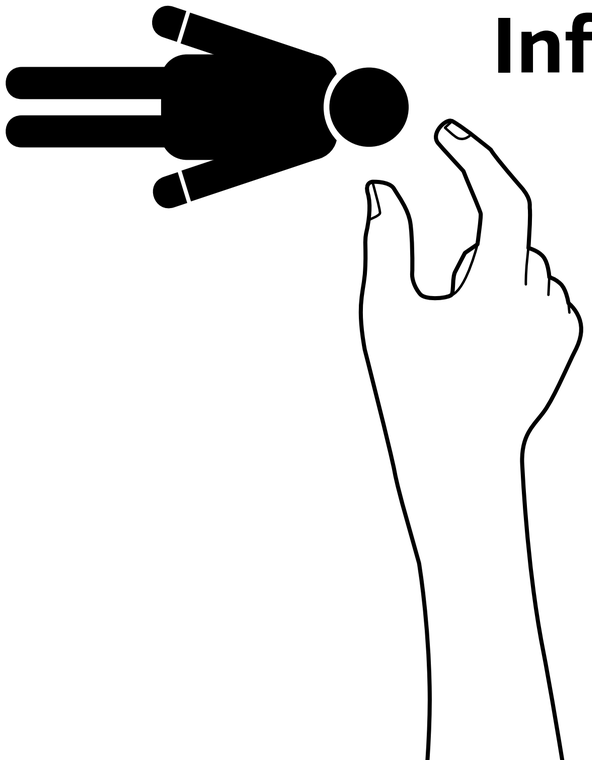
without hyphenation



Real-time TOP K Statistics

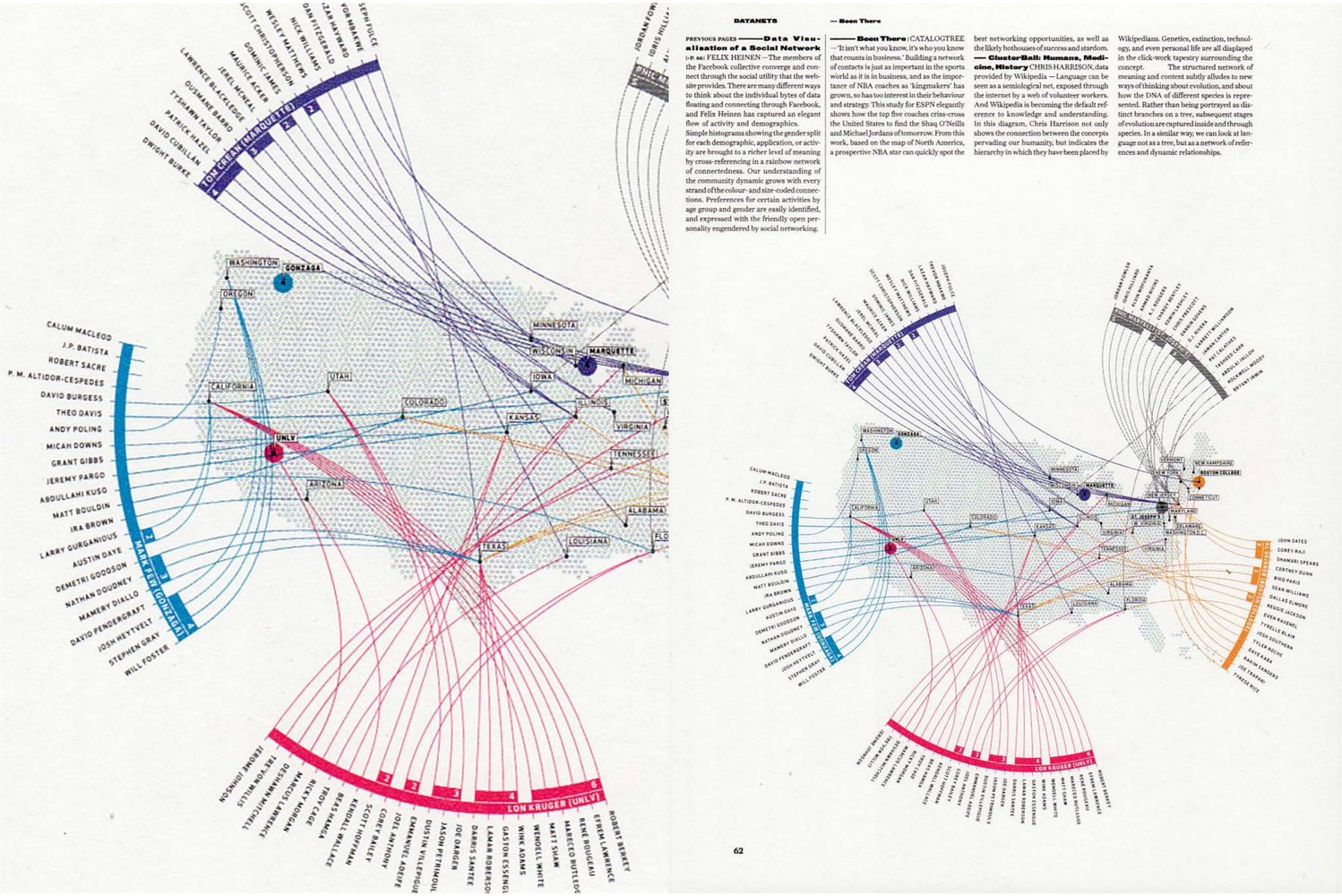
Provides a real-time computation of Top K statistics to enhance network situational overview.

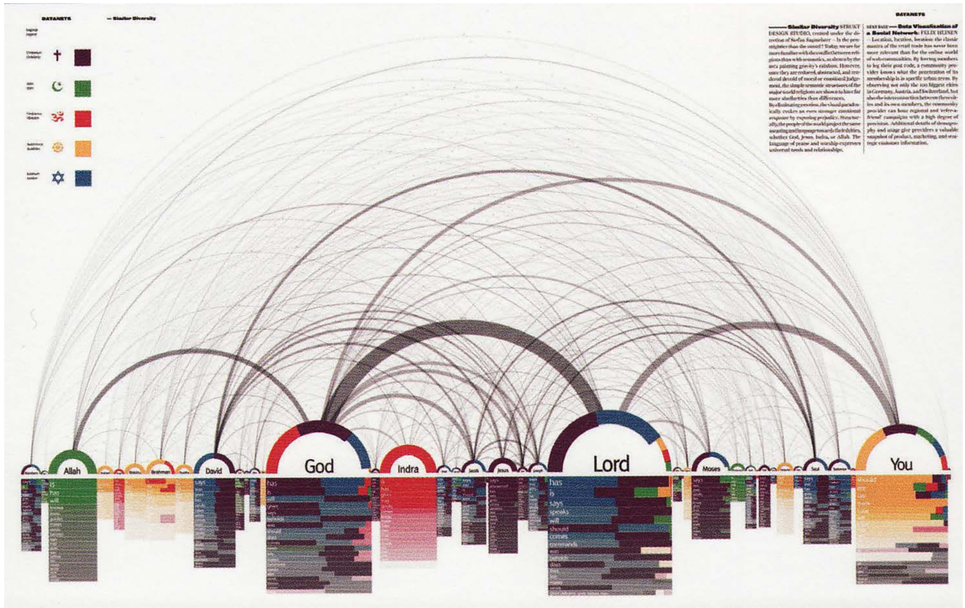




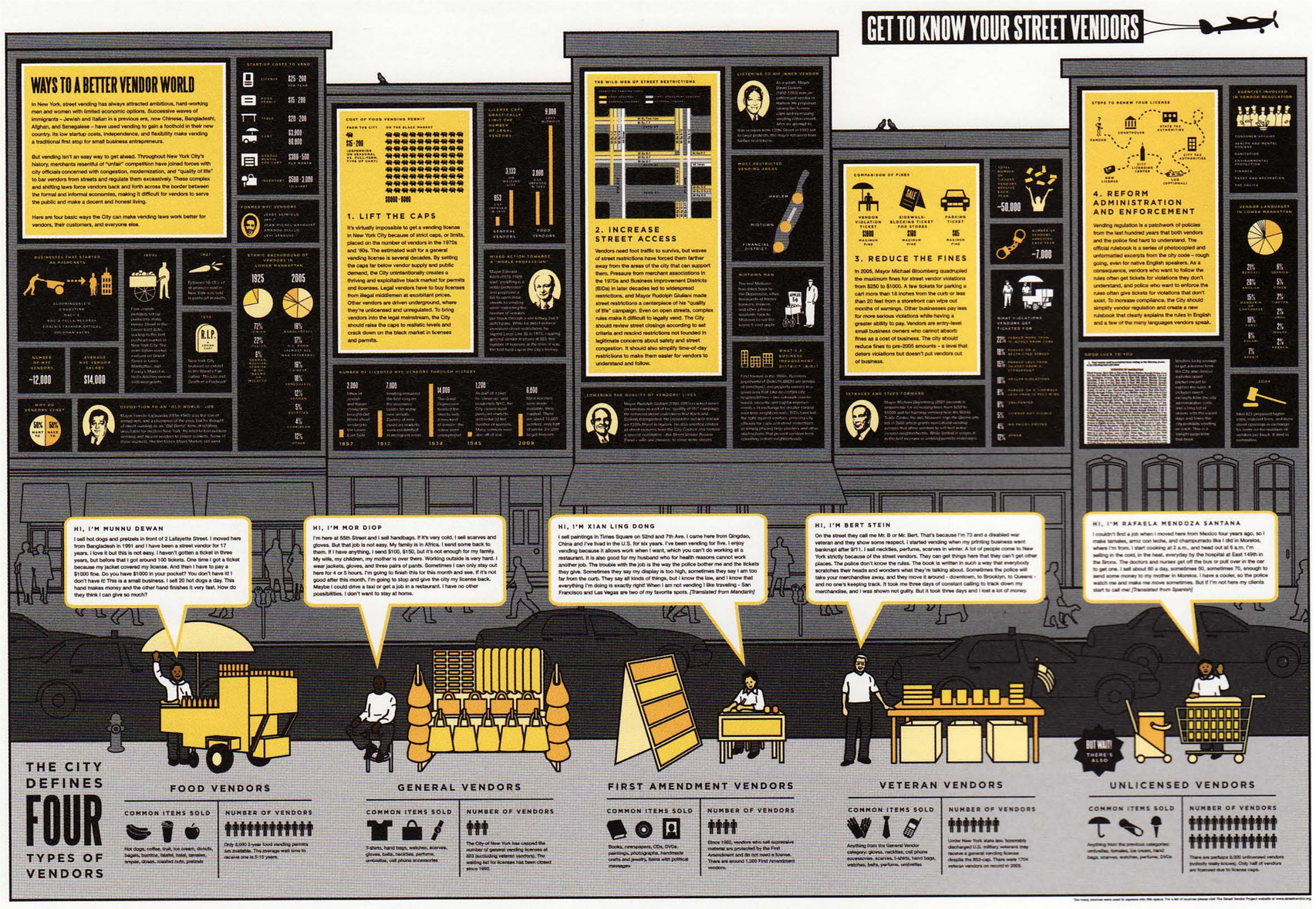
Infographics

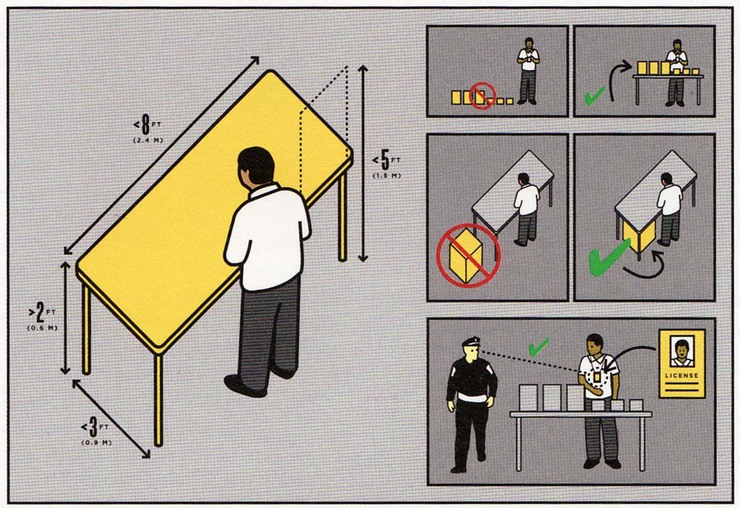
Infographics





Infographics





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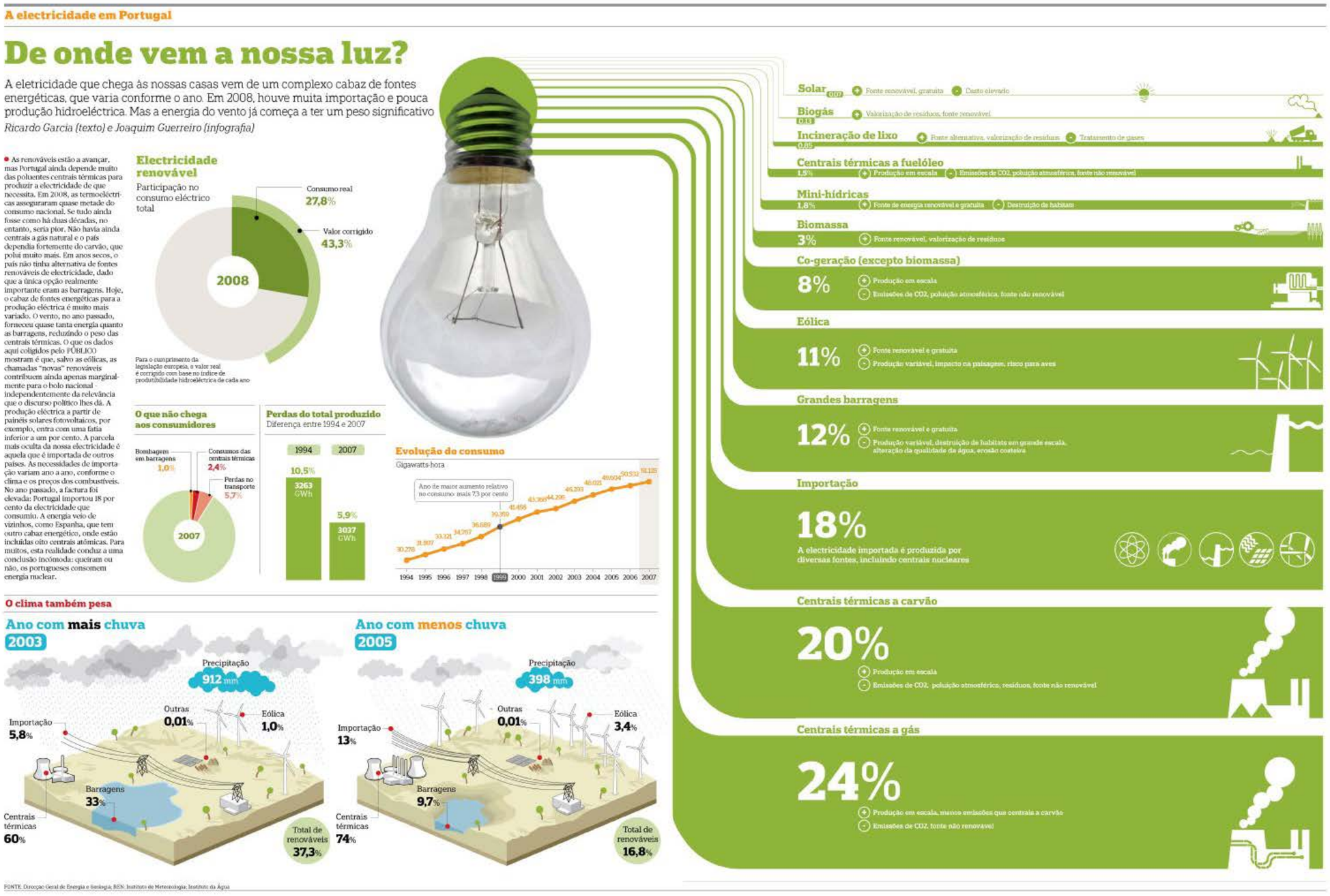

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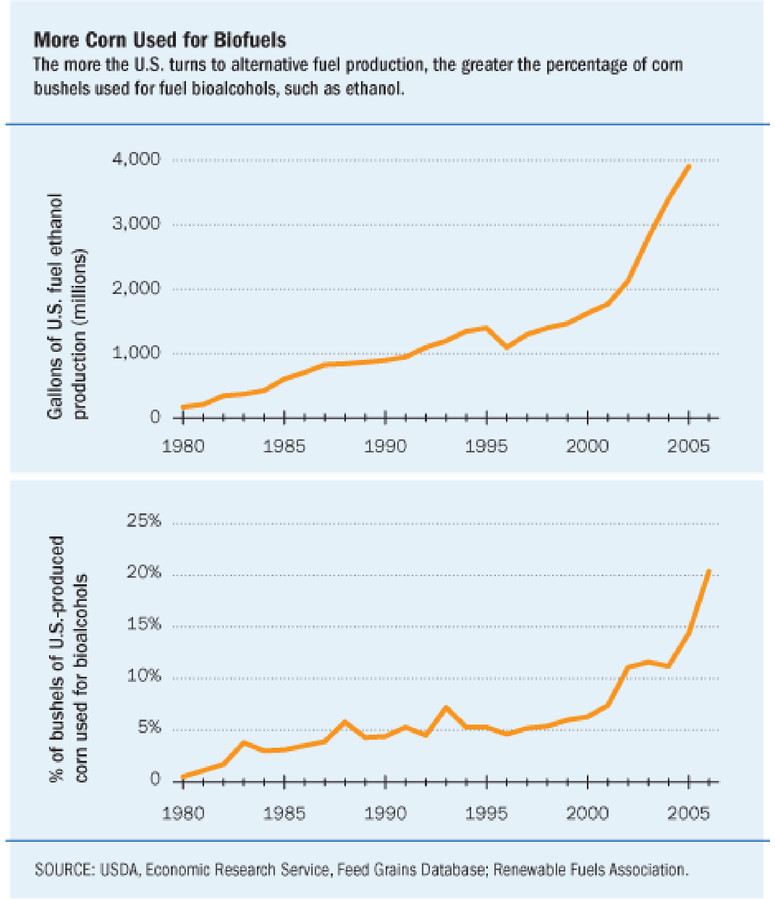

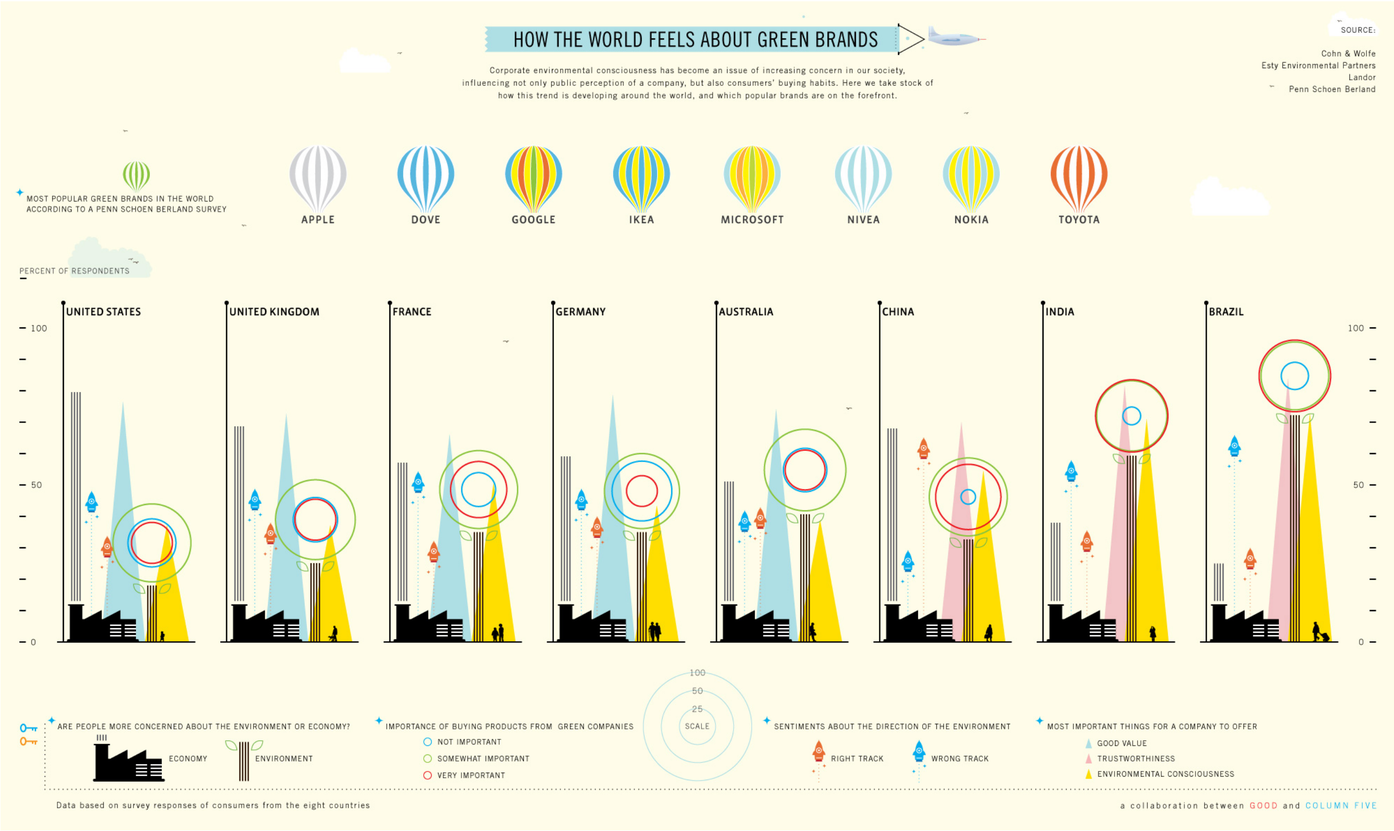

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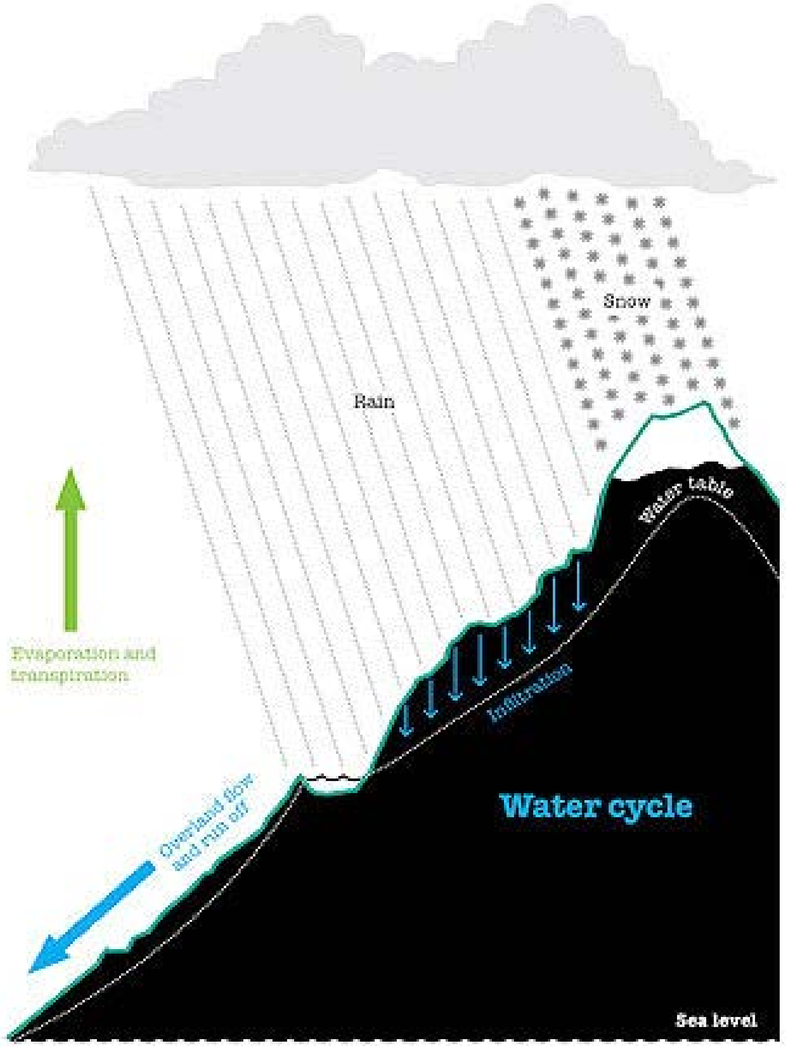
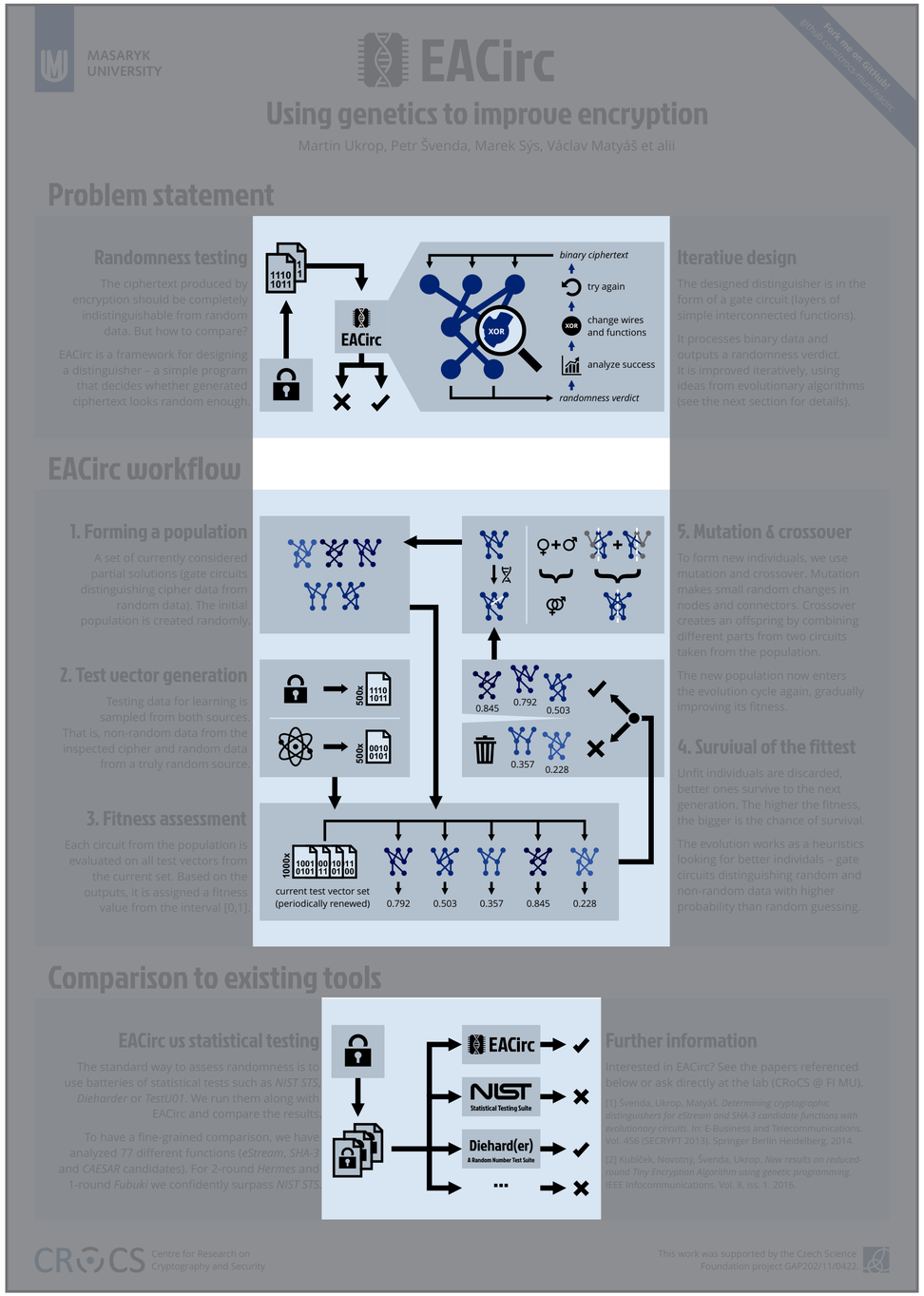
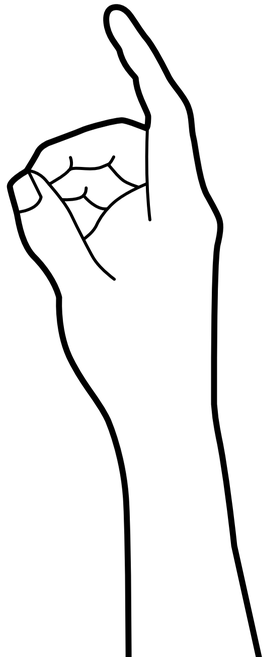


Case study
Graphic design style



Infographics enhance the design

Process of creating poster

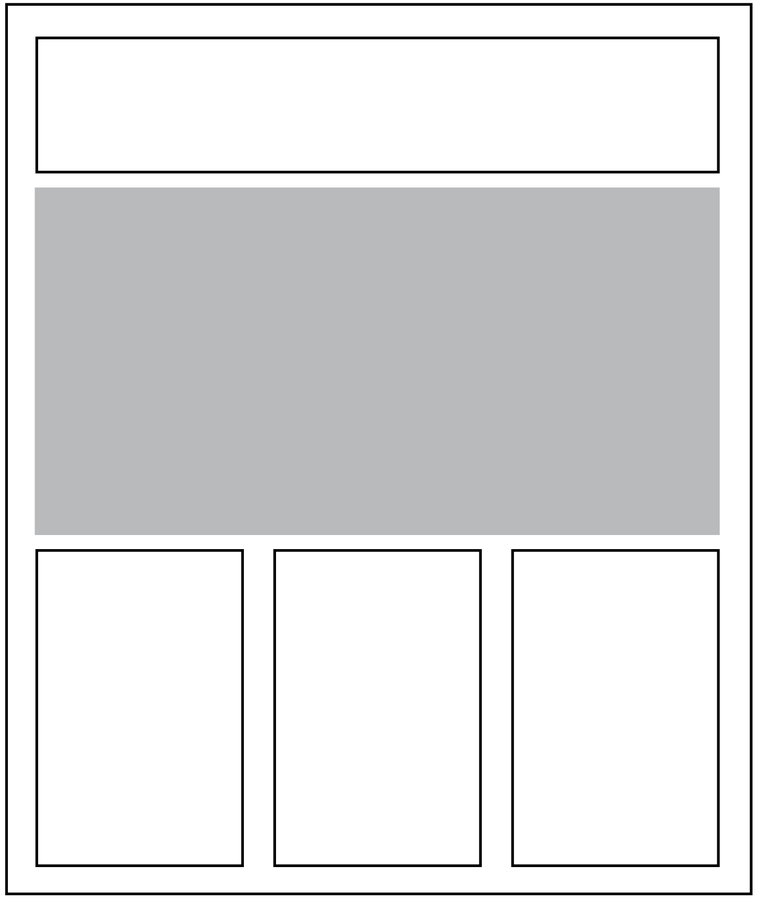


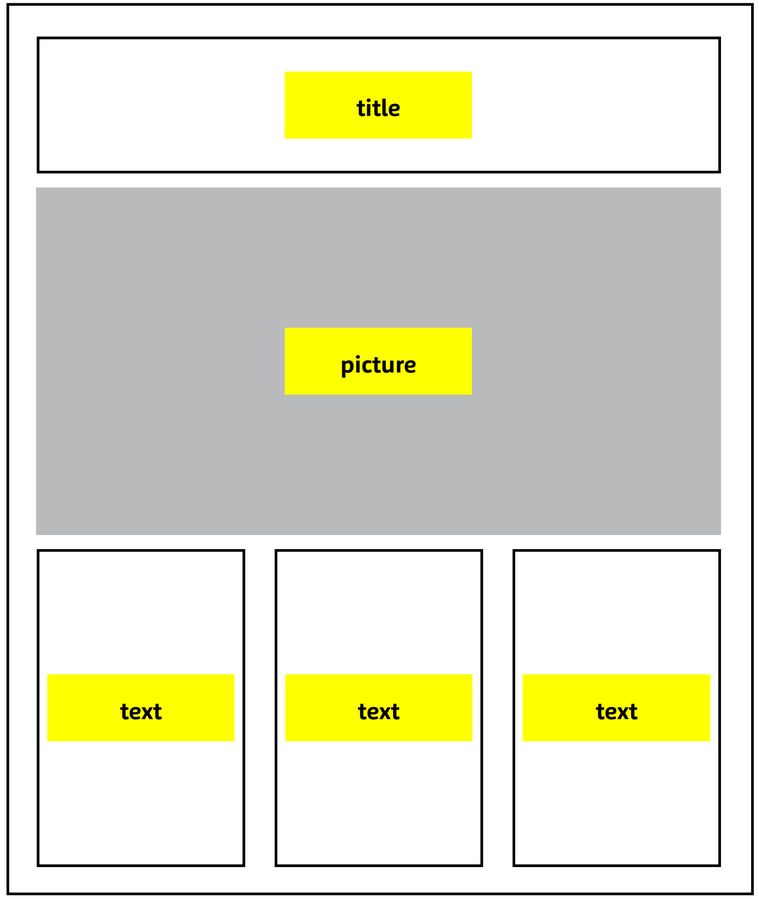
1

Define a grid

Define a layout

Define a positon of text and pictures





2

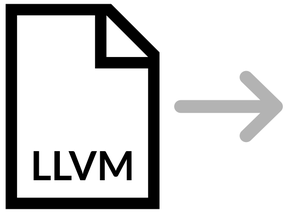
Hierarchy of information

Compose elements

Try to find balance between text an images

DIVINE

DIVINE is a tool for verification of parallel C++ programs. By using the LLVM compilation framework with the Clang compiler and the libc++ library it provides support for most of the standard C++ library and all the C++ language features. **DIVINE** is rather efficient when dealing with programs without inputs (for example test cases).



FACULTY
OF INFORMATICS
Masaryk University

3

Typography

Choose typography

Find a way how to highlight the text – working with different styles (italic, bold,…)

DIVINE

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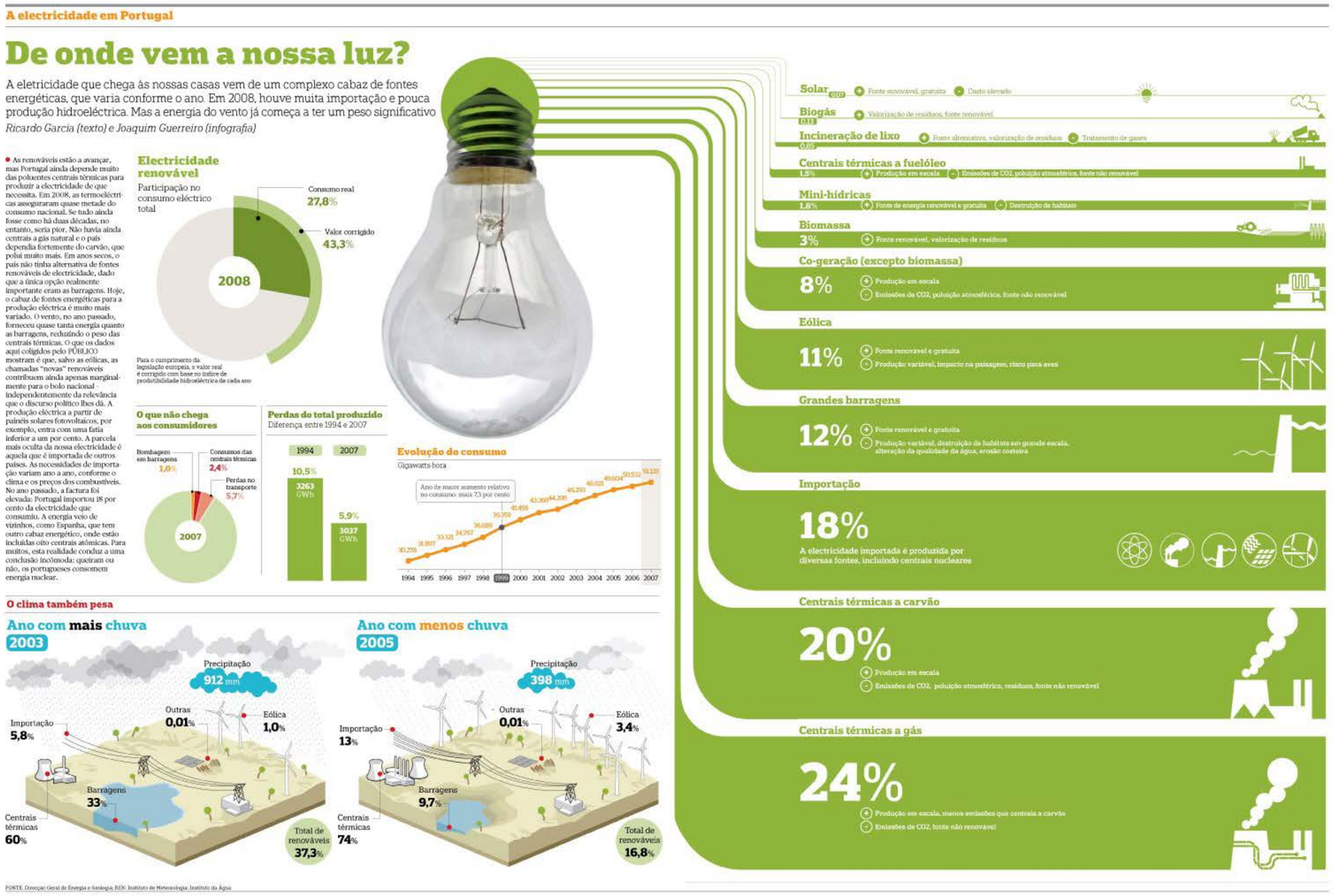
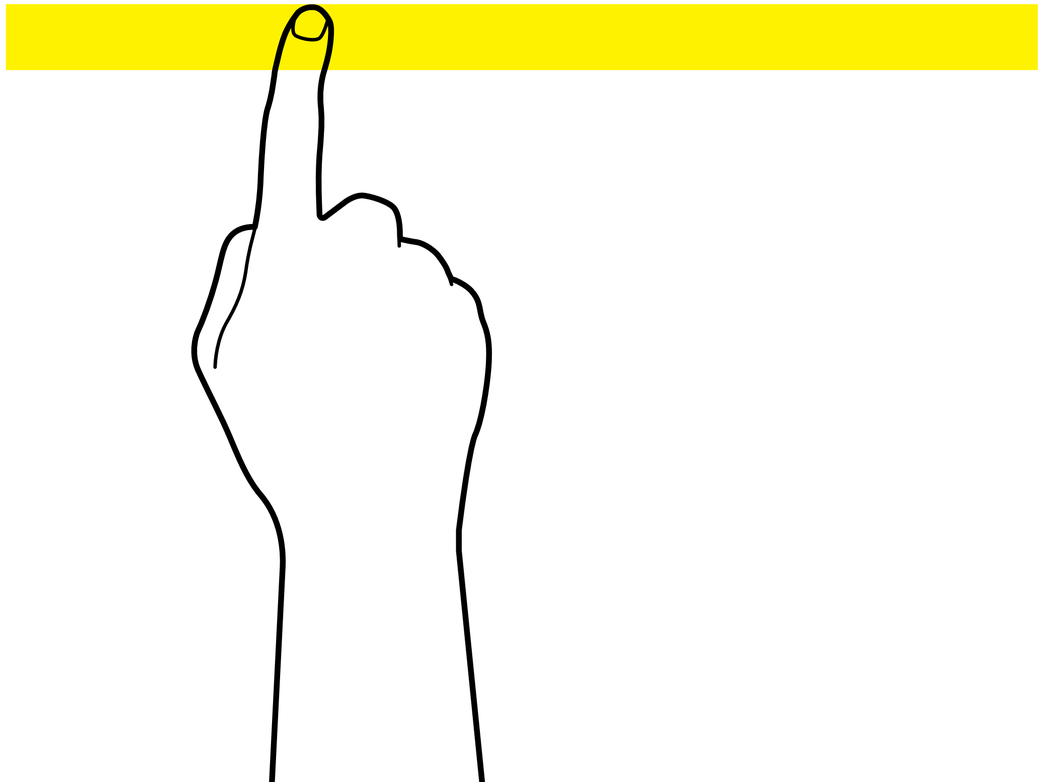
Case study

Good balance between pictures and text



How Visual Weight and Direction Impact Design



Balance

Your composition needs to be in balance, whether symmetrical, asymmetrical, or radial. You'll achieve this balance by placing elements of combined equal visual weight on either side of the optical center

Dominance/Focal Points

Focal points are elements that attract the eye. They're elements of greater visual weight. The dominant element of a design is the element with the greatest visual weight.

Flow

Through focal points, hierarchy, and visual direction you can lead the eye from one part of your design to the next. You'll create a flow through your design.

Scale

Is generally considered to be the relative size of different objects. Here we can consider it in the context of the relative visual weight of different objects.

Depth

Elements with greater visual weight appear to move forward in a design while visually lighter elements recede into the background. We can use this understanding to create depth in a design.

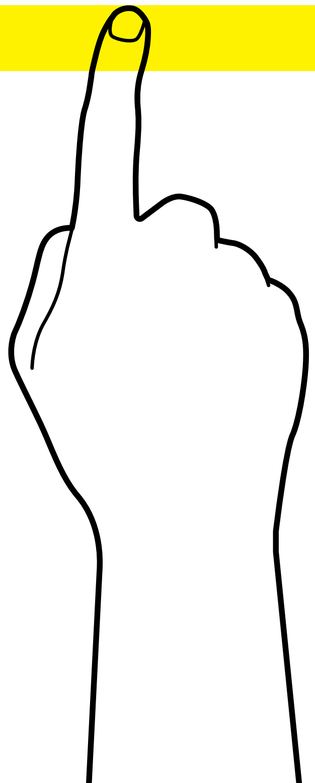
Proportion

Is the relationship in scale between elements. Different proportions in a composition relate to different kinds of balance and can help establish visual weight and depth.

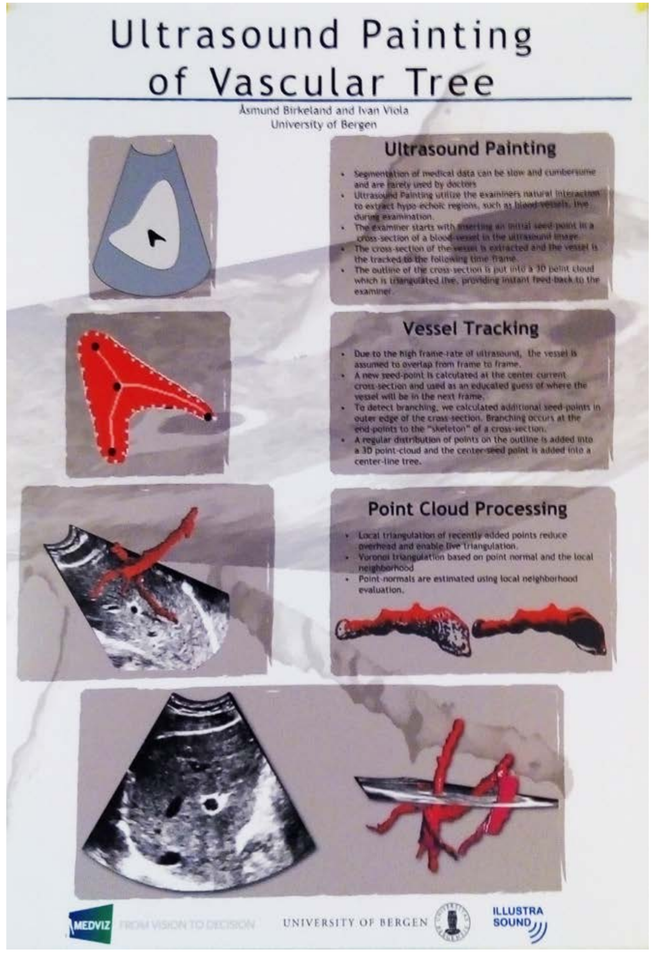
Hierarchy

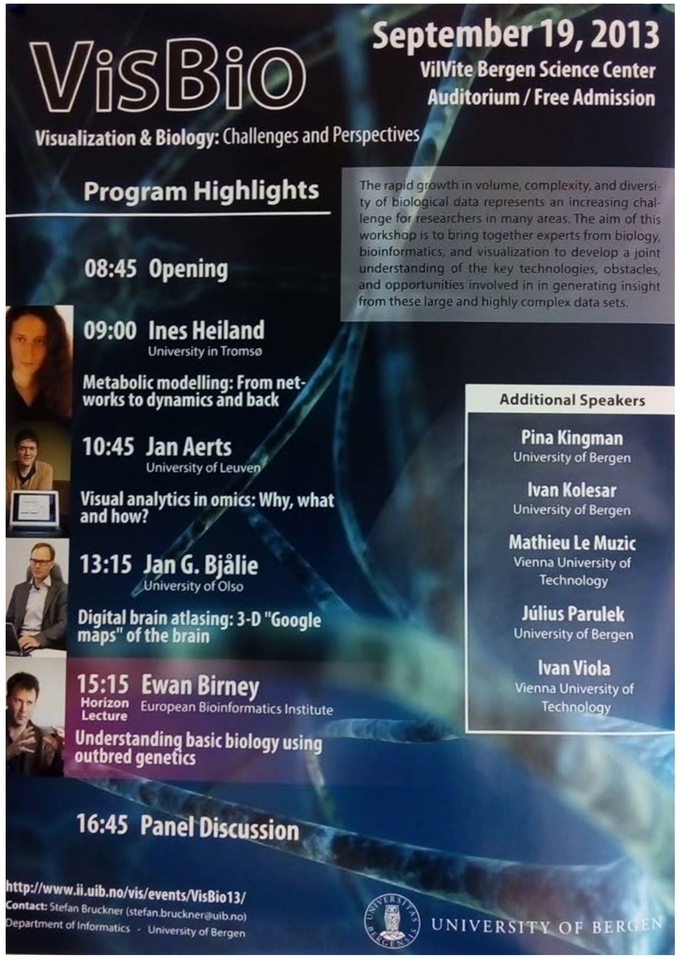
By creating a scale of focal points or elements of different visual weights you can create a hierarchy of design elements. The difference in visual weights is what makes certain elements stand out improving scanability.

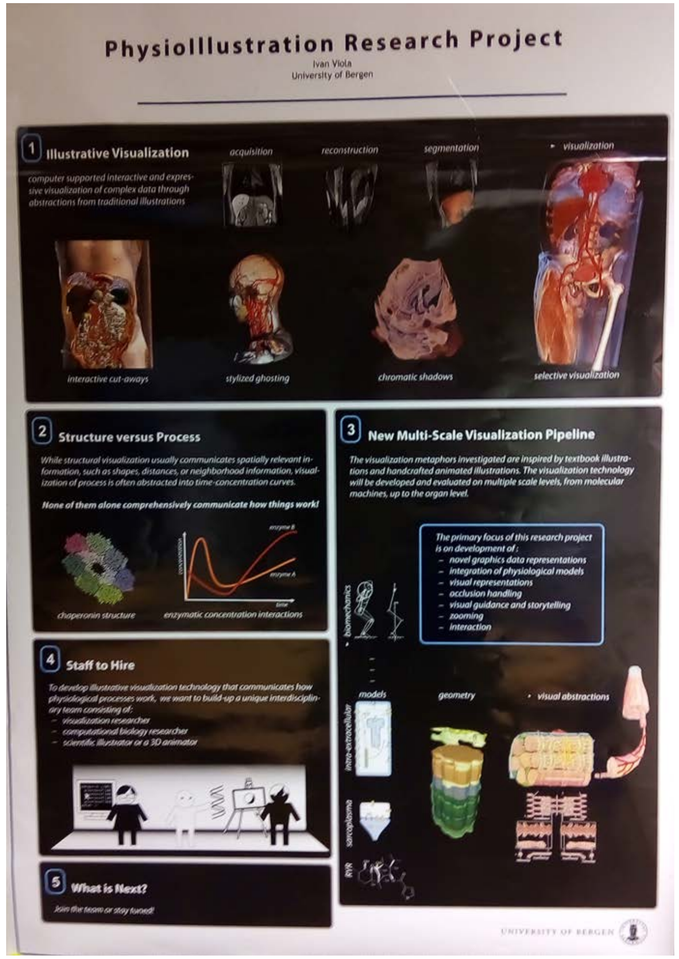
Case study
POSTERS



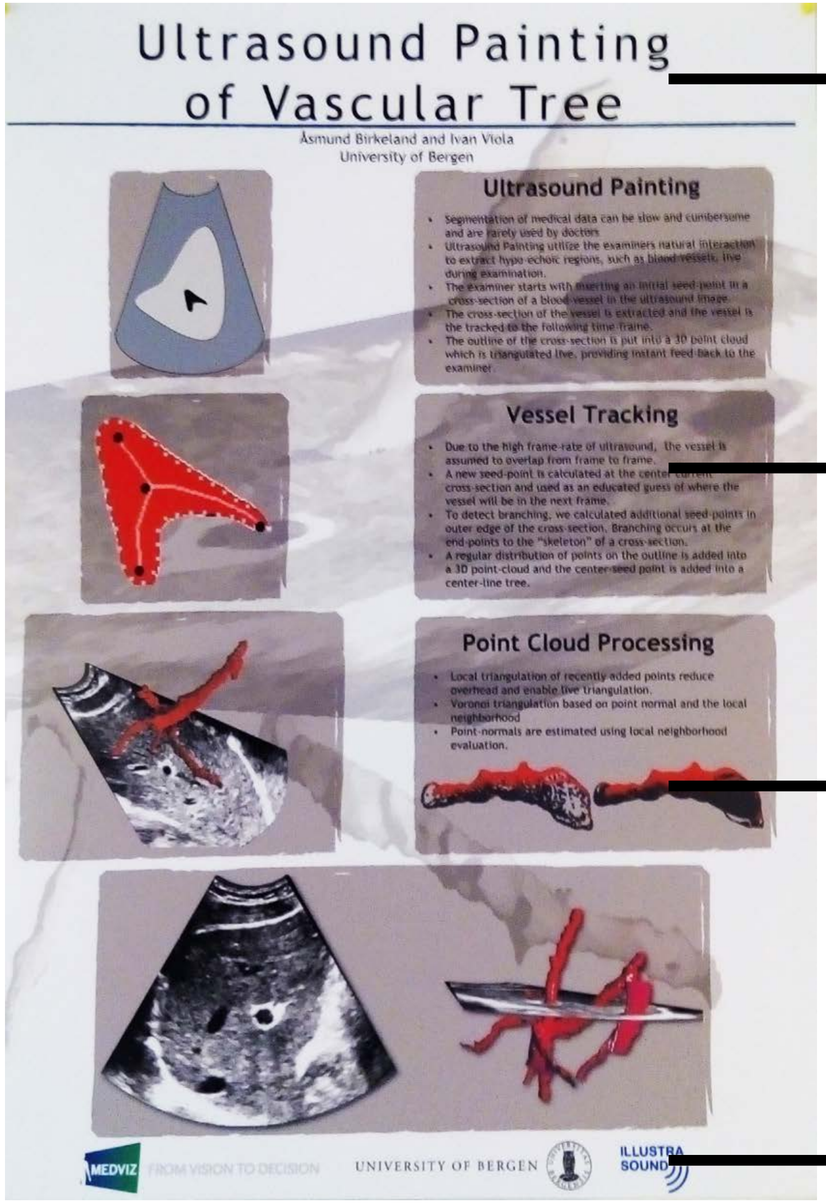
Case study
Posters







Case study
Posters



text – title

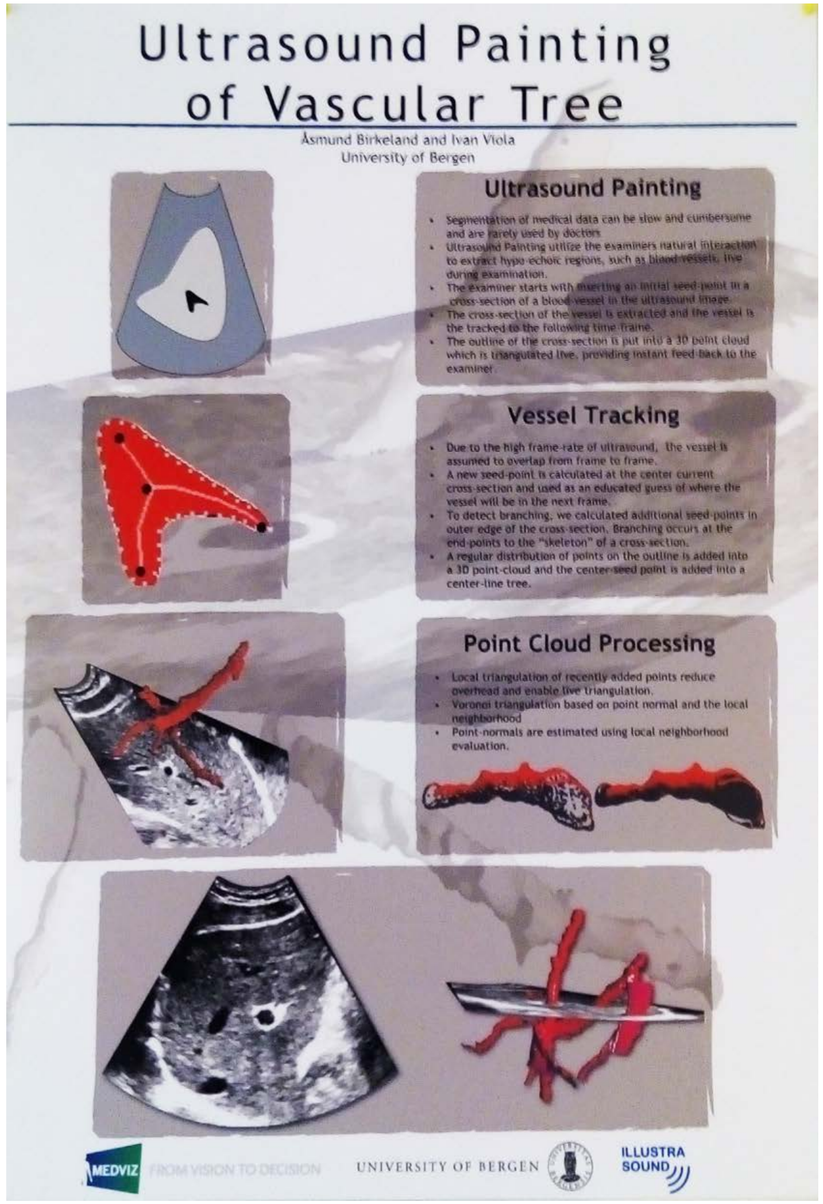
text

images

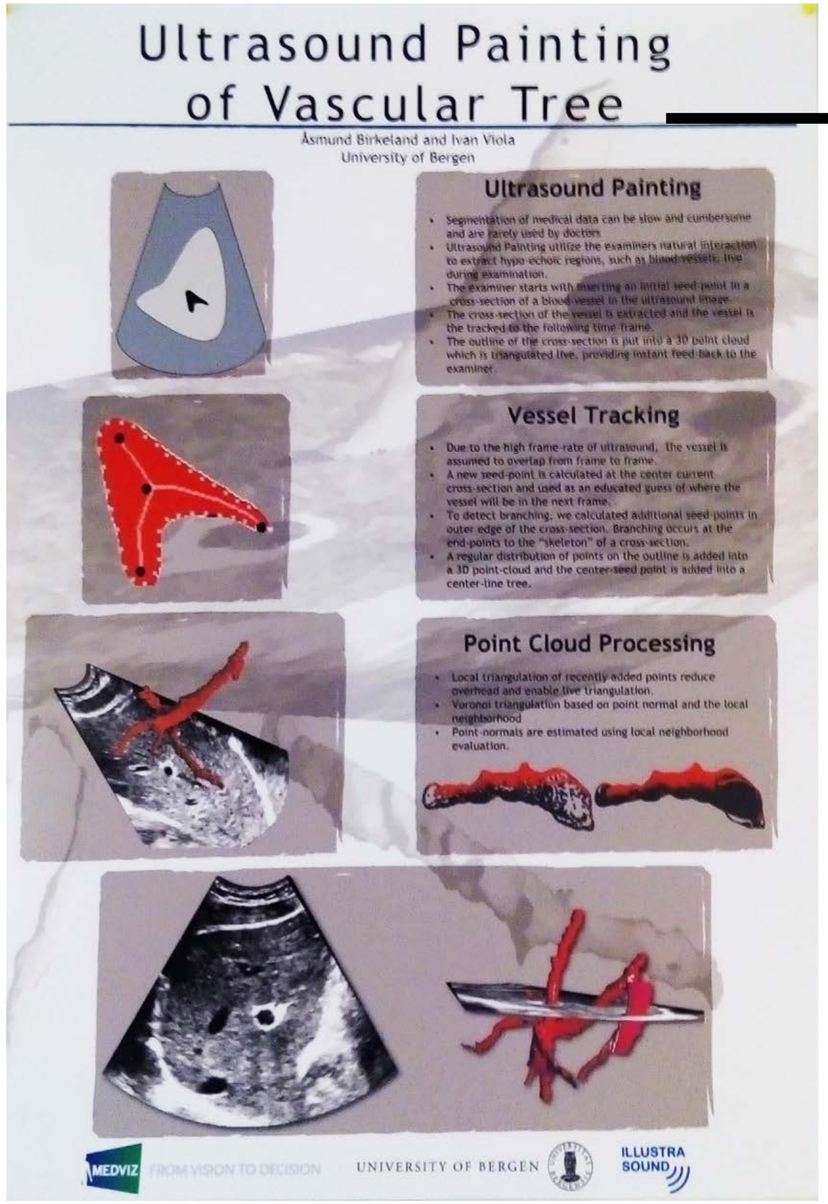
logos

Case study
Posters

Suggestions



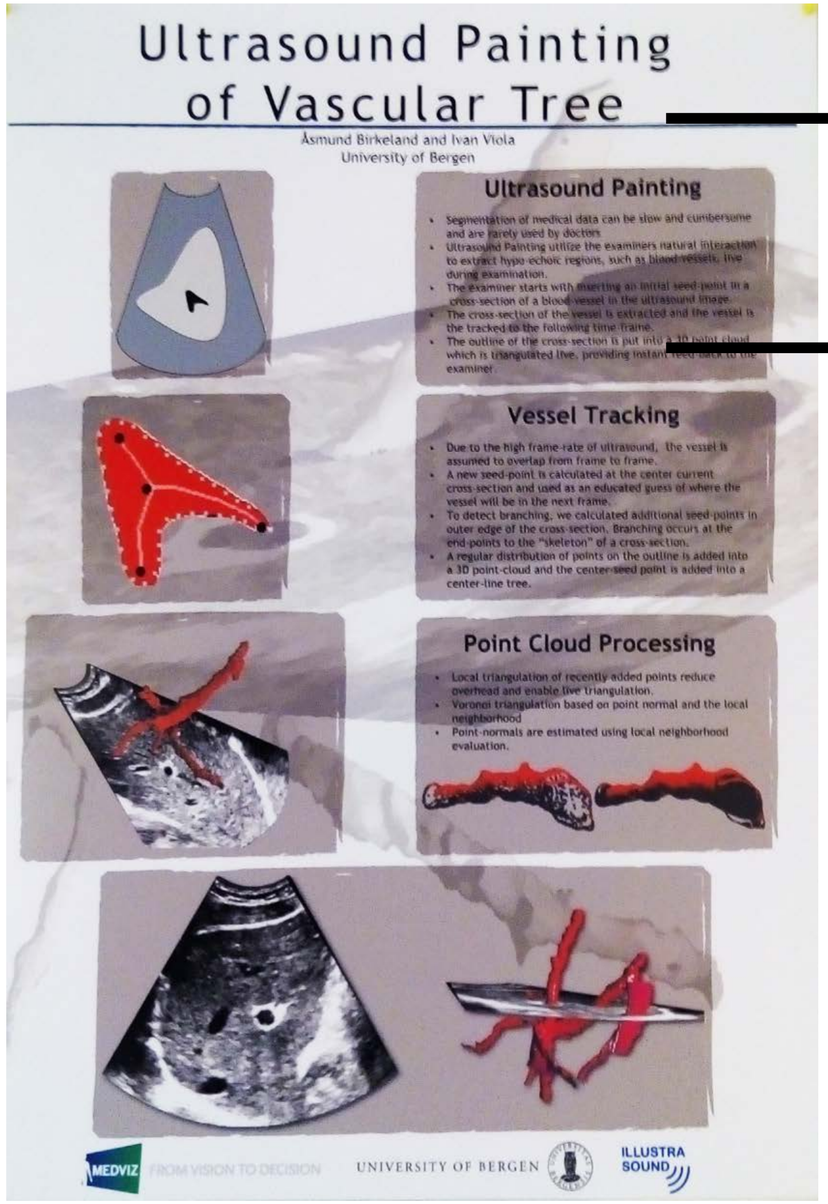
Case study
Posters



more space between elements

Suggestions

Case study
Posters

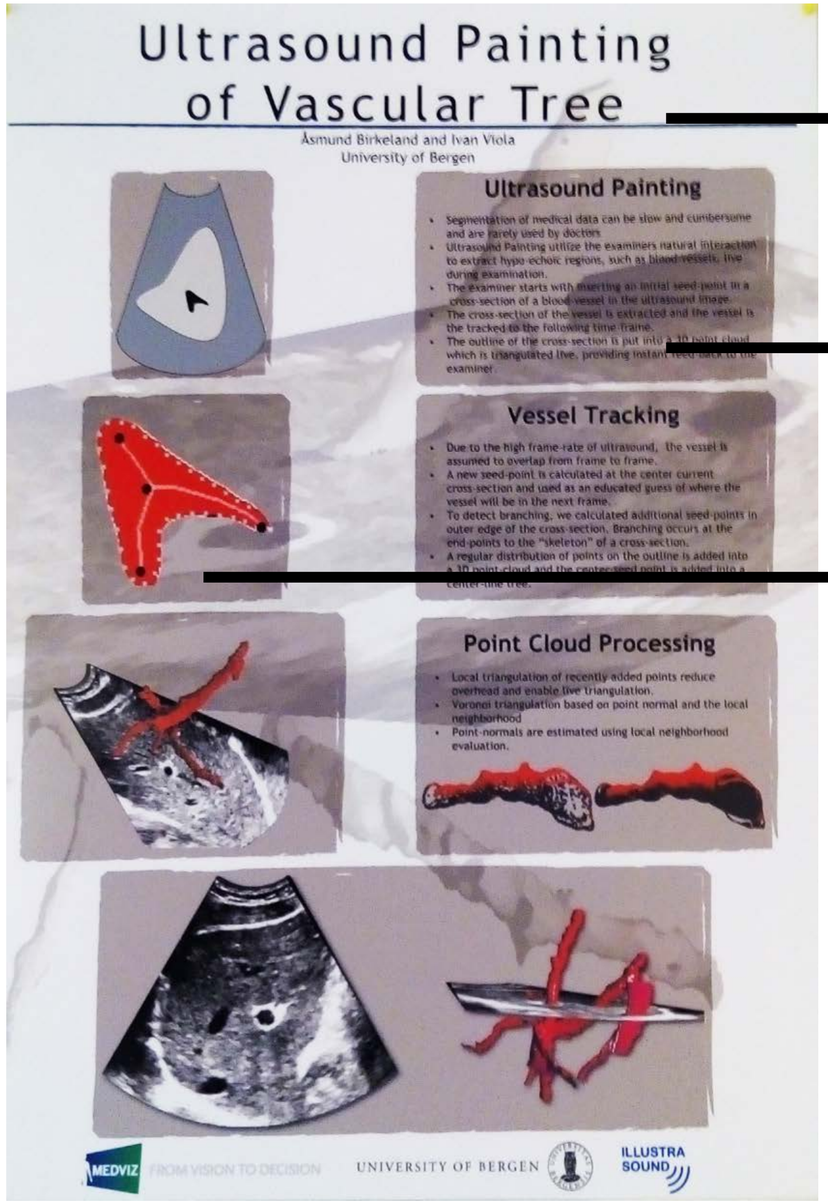


Suggestions

more space between elements

background photo makes text illegible

Case study
Posters



Suggestions

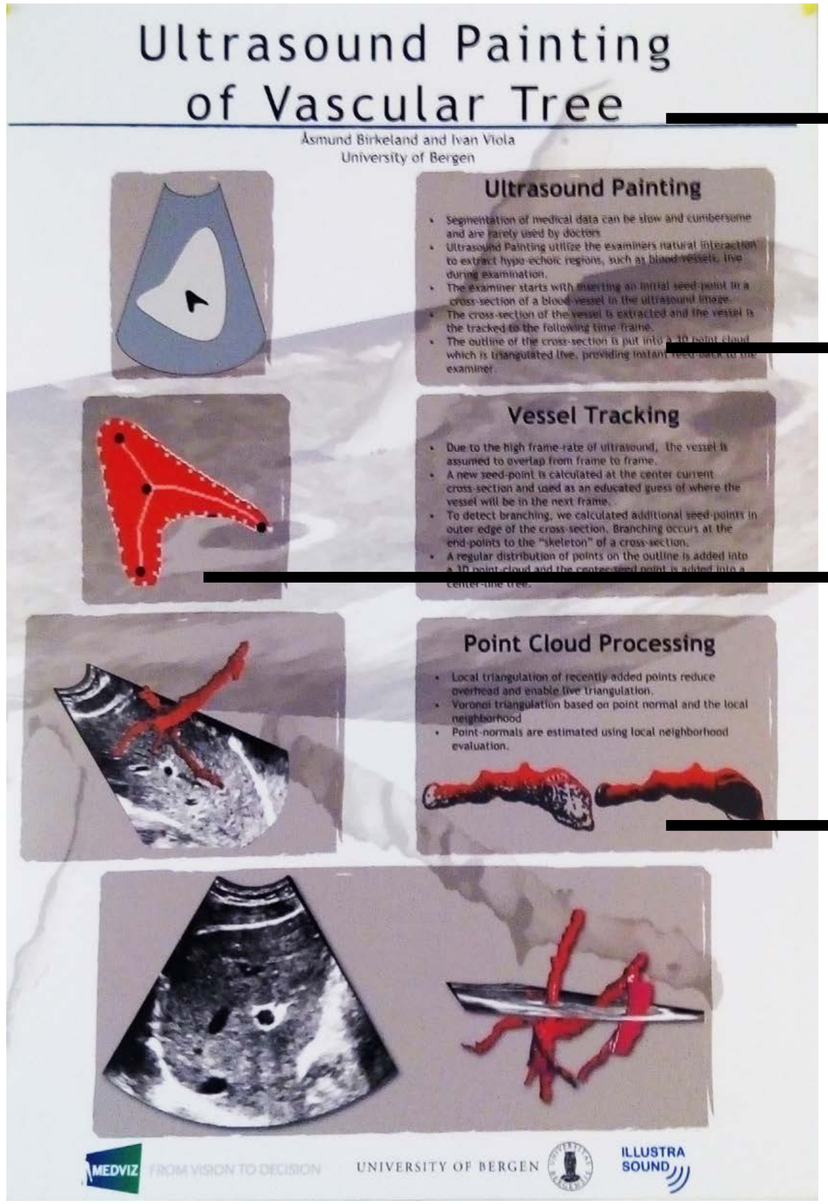
more space between elements

background photo makes text illegible

unite the size and positions of elements

Case study
Posters

Suggestions



more space between elements

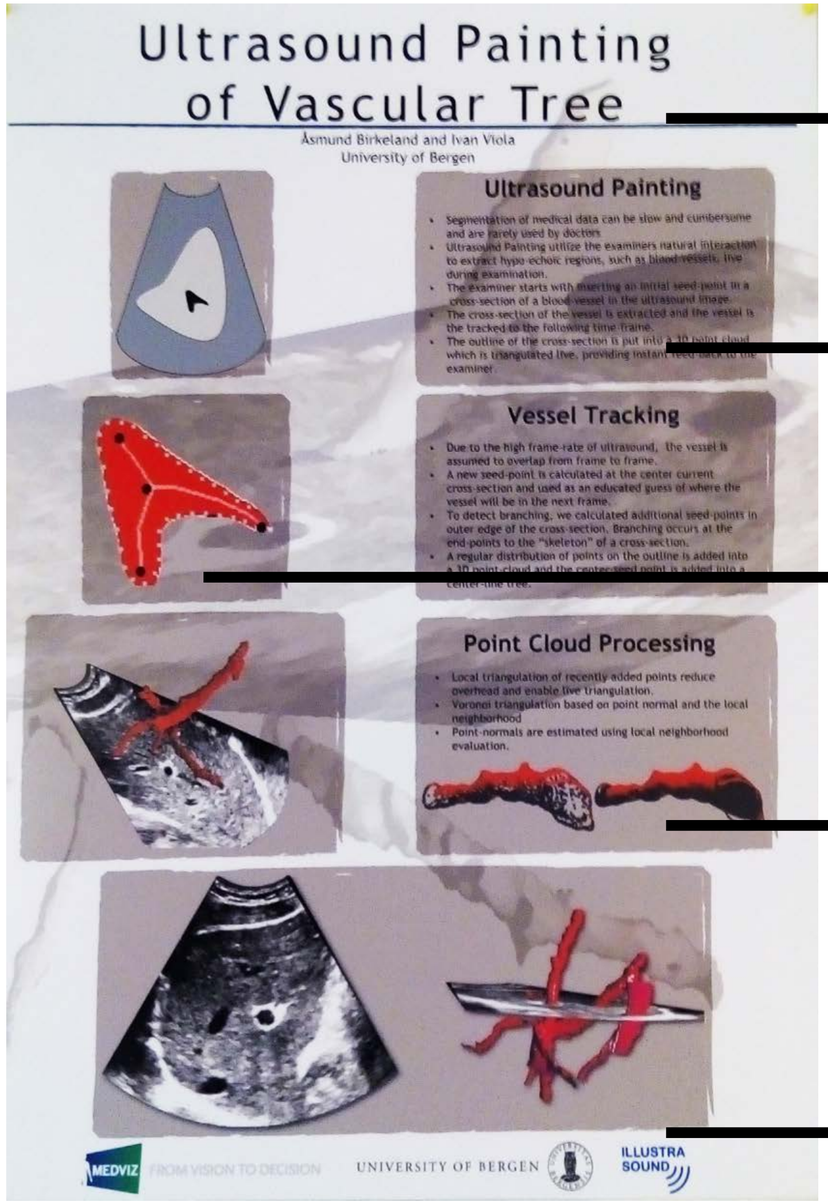
background photo makes text illegible

unite the size and positions of elements

too many overlapping elements – visualizations, photos, ...

Case study
Posters

Suggestions



more space between elements

background photo makes text illegible

unite the size and positions of elements

too many overlapping elements – visualizations, photos, ...

more space between logos and graphic elements

Case study
Posters

Suggestions

more space between elements

background photo makes text illegible

unite the size and positions of elements

too many overlapping elements – visualizations, photos, ...

more space between logos and graphic elements

keep a safety zone around the logo

Nis escienime namende corepe nobis ullam, aut elenda coris exero volorpo ressund empore pa vendem. Bit ut aligendunt alique isti cusa nihic to tem sant quias ea dolorum eumquatem quae nulpa cuptata ipisciuntis dolorescid et abor alitinc imilleste pro volendam, ut voluptata qui consedit aut rectotatur, nis ut porum eos samusae consequodi dunt excerio consedit iderum ne sum volorib usapediscias.

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wider text box

Typography

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rivers

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left alignment

Settings of type and type box influences the layout

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rivers

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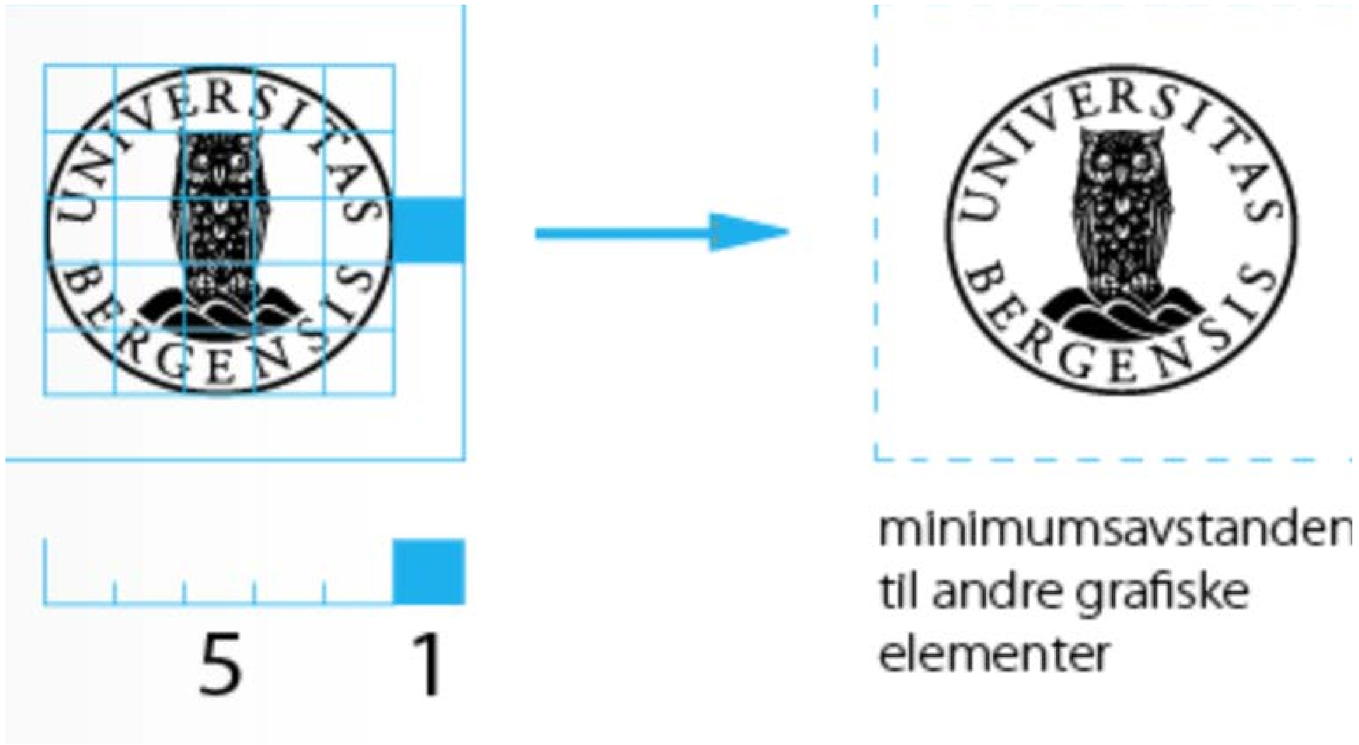
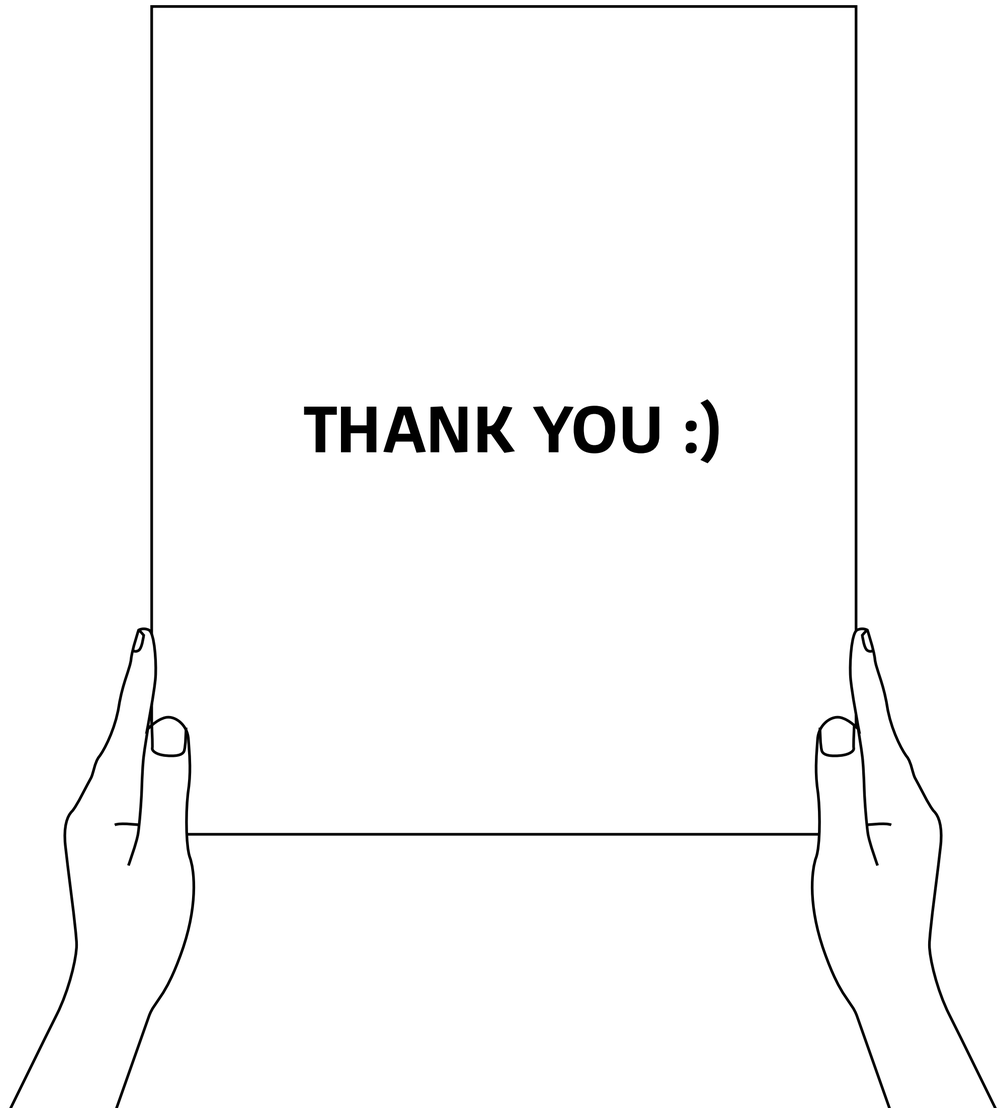
smaller font size + hyphenation

Settings of type and type box influences the layout



Logo safety zone


THANK YOU :)