A generic and integrated software support for the visualization of metrics in the context of Enterprise Architecture Management

Final presentation

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Motivation

Metrics in Tricia:

Application continuity plan availability

A measure of how completely IT continuity plans for business critical applications have been drawn & tested up for the IT's application portfolio.

Mxl expression

```
let criticalApplications =
  find('Business Application').where('is critical') in
    criticalApplications.ratio('covered by' <> null)
```
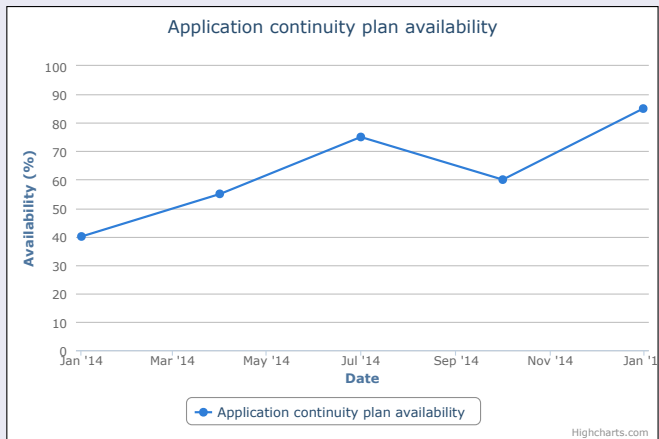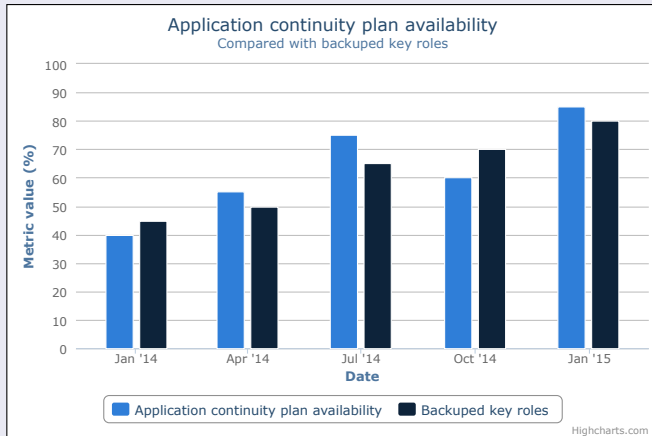
Interpretation

problematic if < 60%
normal if between 60% - 80%
good if > 80%

Vision

Metric visualization (snapshot)

Application continuity plan availability

0   25   50   75   100 %

Vision

Metric visualization (over time)

Vision

Metric visualization (combined)

Outline

Research questions

RQ1: What are recommended visualizations for metrics in literature?

RQ2: What type of visualizations are recommended for metrics in the domain of EAM?

RQ3: What are suitable web-based visualization libraries to support the visualization of metrics in the domain of EAM?

RQ4: What is a suitable prototypical implementation of a corresponding visualization extension of Tricia?

Findings

- Many authors use metrics and propose visualizations.
- None of them states *how* to use visualizations to properly represent metrics.
- Visualization of metrics in the domain of EAM is sparsely researched (cf. Lankes, [2008]).
- Practitioners and researchers contradict each other.

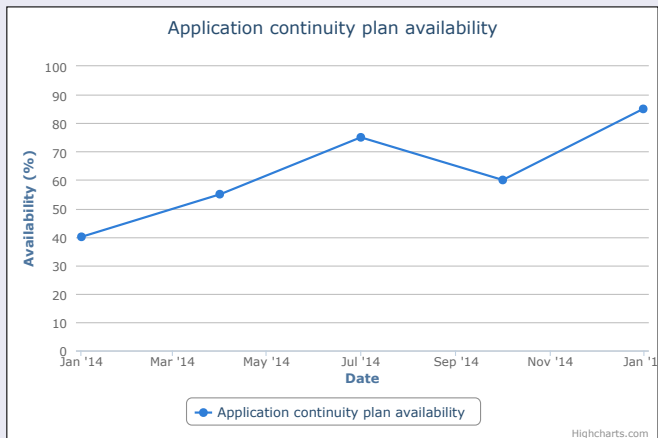# Gap between practitioners and researchers

Practitioners

- Make heavy use of gauges and pie charts
- Seldom care about consistent coloration or comparability
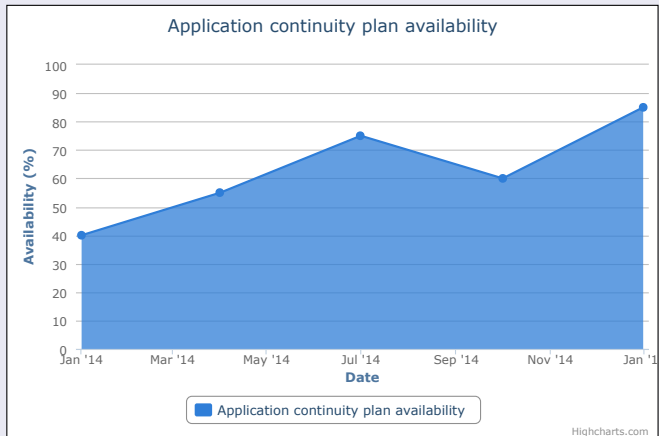- Employ visualizations distorting data

Researchers

- Prefer line charts and bar charts
- Reject pie charts, gauges, and kiviat charts
- Favour monochrome, minimalistic visualizations
- Care about comparability of visualizations
- Demand visualizations without data distortion

Requirements for the prototype

1. Support the visualization of all metrics from the Metric Catalog by all types of recommended visualizations.
2. The visualizations operate on the results from related TxL expressions.
3. Integration of the visualization prototype in Tricia.
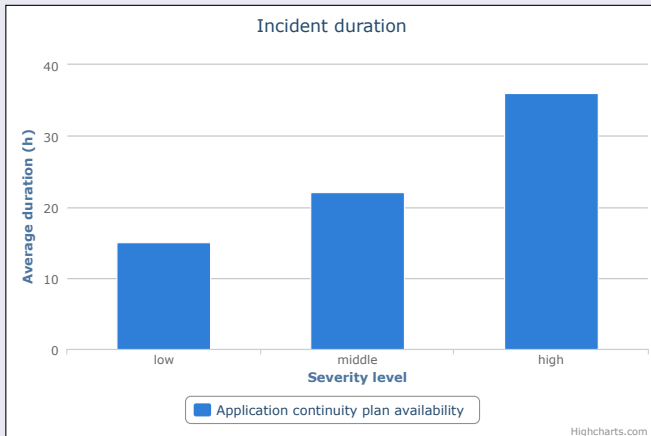4. The prototype must enable users to define visualizations for their metrics.
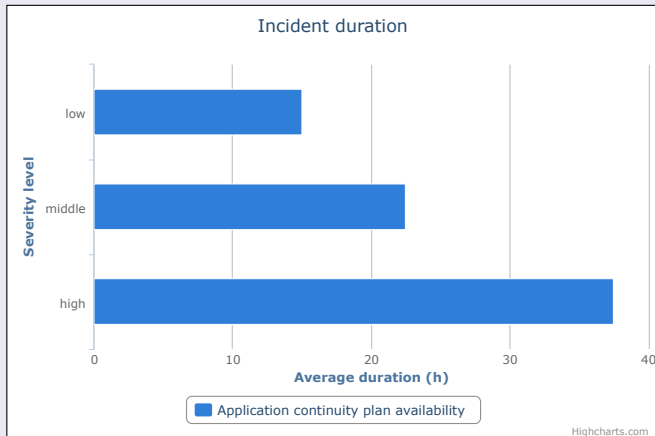
Visualization types (RQ1) II
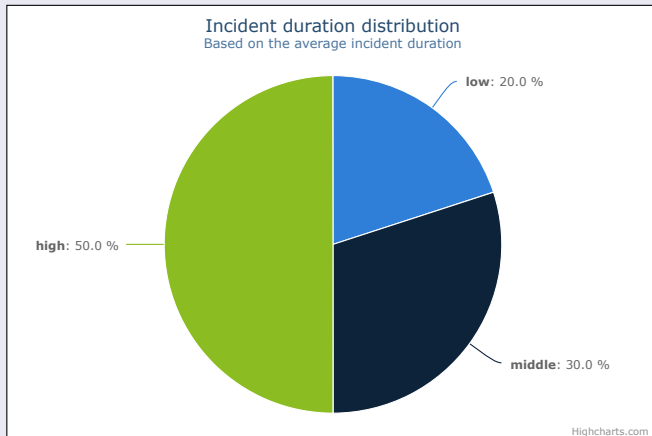
Area chart

Visualization types (RQ1) III

Column chart

Bar chart

Visualization types (RQ1) V

Kiviat chart

Bullet chart

Application continuity plan availability

Recommended visualization types (RQ2)

Recommendations based on the Metric Catalog

Metric result type	Perspective	
	Snapshot	**Over time**
monetary value	bullet chart	line / column chart
multiple values	column chart	line / column chart
number	bullet chart	line / column chart
percentage	bullet chart	line / column chart

Visualization engines (RQ3)

	RGraph	g.Raphaël	NVD3	Highcharts
Line chart	●	●	●	●
Area chart	●	○	●	●
Column chart	●	●	●	●
Bar chart	●	●	●	●
Pie chart	●	●	●	●
Kiviat chart	●	○	○	●
Bullet chart	○	○	●	◑
Dynamic	●	●	●	●
Documentation	●	●	○	●
Interactivity	○	◑	●	●

Visualization terminology
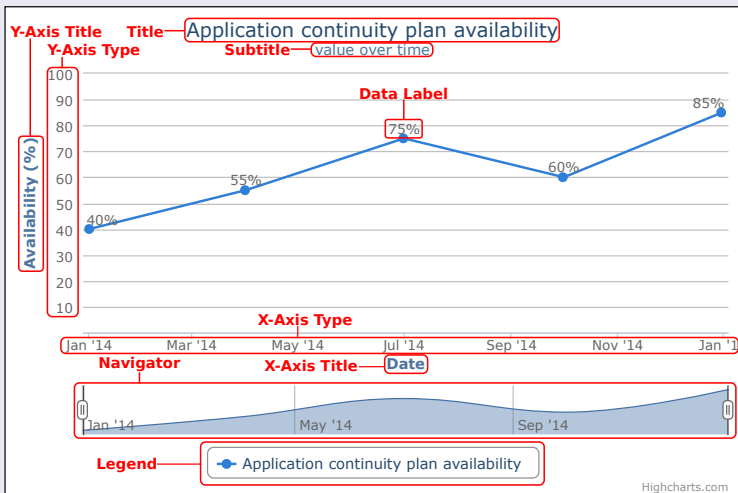
TxL expressions

Allowed types

```
expression ::   String → Number          (e.g. column chart)
expression ::   Date → Number            (e.g. line chart)
expression ::   Number                   (e.g. bullet chart)
```

Mxl expression (Number)

```
let criticalApplications =
  find('Business Application').where('is critical') in
    criticalApplications.ratio('covered by' <> null)
```

Wrapper expression (Date → Number)

```
applicationContinuityPlanAvailability() @ date * 100
```

Visualization Template

Empty template

```json
{
  "properties": {
  },
  "configuration": {
  },
  "highcharts_config": {
  },
  "highcharts_expert": {
  }
}
```
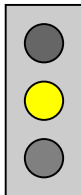
Conclusion

- Metric visualization is a diverse subject.
- We drew our own conclusions and derived a set of recommended metric visualizations from literature.
- The prototypical extension of Tricia can be used to visualize all metrics of the catalog.
- Missing TxL features (at the time of writing) prevent the visualization of values over time.

Future Research

- Visualization of historical data
- Dynamic configuration dialog
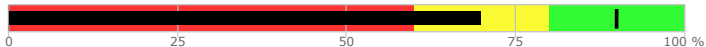- Usability analysis
- Graphical drill-down on visualizations

DEMO

Live Demo

Gauge

Application Continuity Plan Availability

Visualization Template I

Template properties (line chart)

```
1    "properties": {"name": "Line Chart", "image": "line_chart.png",
2      "x_axis_types": ["datetime"],
3      "y_axis_types": ["linear", "logarithmic"],
4      "date_intervals": ["daily", "weekly", "monthly", "quarterly", "
          annually"],
5      "no_of_metrics": "multiple",
6      "title_editable": true,
7      /* other editable flags omitted */
8      "categories_editable": true,
9      "default_categories": [],
10     "default_date_range": [],
11     "default_date_interval": "monthly",
12     "metric_series": [],
13     "metric_series_addition": {}}
```

Visualization Template II

Template configuration

```
"configuration": {
  "categories": [],
  "date_range": [],
  "date_interval": "",
  "title": "",
  "subtitle": "",
  "x_axis_type": "",
  "x_axis_title": "",
  "y_axis_type": "",
  "y_axis_title": "",
  "navigator": true,
  "data_label": false,
  "series": [],
  "container": ""
}
```

Visualization Template III

Embedded visualization

```
1   $[metricVisualization()$
2     {"properties": {"name": "Bullet Chart"},
3      "configuration": {
4        "title": "Application Continuity Plan Availability",
5        /* defaults omitted */
6        "series": [{
7          "name": "Measure",
8          "id": "applicationContinuityPlanAvailability",
9          "data": []
10       },{
11         "name": "Target",
12         "id": "applicationContinuityPlanAvailabilityTarget",
13         "type": "scatter",
14         "data": []
15       }],
16        "container": ""}
17      "highcharts_expert": {}}
18   $metricVisualization]$
```

Visualization Template IV

"Expert" configuration

```json
{
  "properties": {
    "name": "Bullet Chart",
    /* omitted*/
  },
  "configuration": {
  /* omitted */
  },
  "highcharts_expert": {
    "chart":{"borderWidth": 2}
  }
}
```

Result
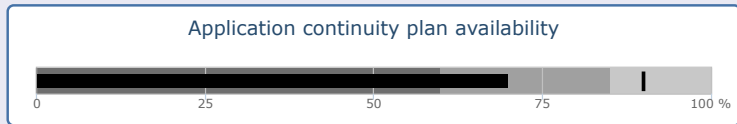
Application continuity plan availability

Visualization of historical data

```
let criticalApplications =
  find('Business Application').where('is critical') in
    criticalApplications.ratio('covered by' <> null)

applicationContinuityPlanAvailability() @ date * 100
```

Dynamic configuration dialog

```
"dialog": [
 {"label": "Border color",
  "type": "color",
  "mapped_to": {
   "chart": {
    "borderColor": "#000000"}}},
 {"label": "Border width",
  "type": "number",
  "mapped_to": {
   "chart": {
    "borderWidth": 0}}}]
```

Border Color	
Border Width	0

Guided metric selection