CITY OF NEW ORLEANS

Introducing analytics

A guide for departments

Executive summary

- Analytics is an approach that:
  - i) **uses data to generate new insights** into city services and the needs they serve; and
  - ii) applies these insights to **improve service delivery.**

- It is designed to help departments **work smarter** – using existing data sources and in-house technology to achieve **better results with existing resources.**

- Analytics projects have been used in cities across the country to improve a wide range of services –from public health to infrastructure and from public safety to permit enforcement.

- There are many ways in which better use of data can enhance city services. OPA partners with city departments to help them **identify and deliver projects.**

Analytics can help with a range of departmental problem types

Opportunity	Underlying issue	Analytics opportunity
A) Finding the needle in a haystack	• Targets are difficult to identify or locate within a broader population	Predictive modelling to pick out targets based on existing data
B) Prioritizing work for impact	• Services do not categorize high-priority cases early	Predictive modelling allows prioritization of cases
C) Early warning tools	• Resources overly focused on reactive services	Tools to predict need based on historic patterns
D) Better, quicker decisions	• Repeated decisions are made without access to all relevant information	Recommendation tools for operational decisions
E) Optimizing resource allocation	• Assets are scheduled or deployed without input of latest service data	Data-driven deployment of resources
F) Experimenting for what works	• Services have not been assessed for impact	Experimental testing and improvement of service options

How to use this presentation

This presentation is designed to:

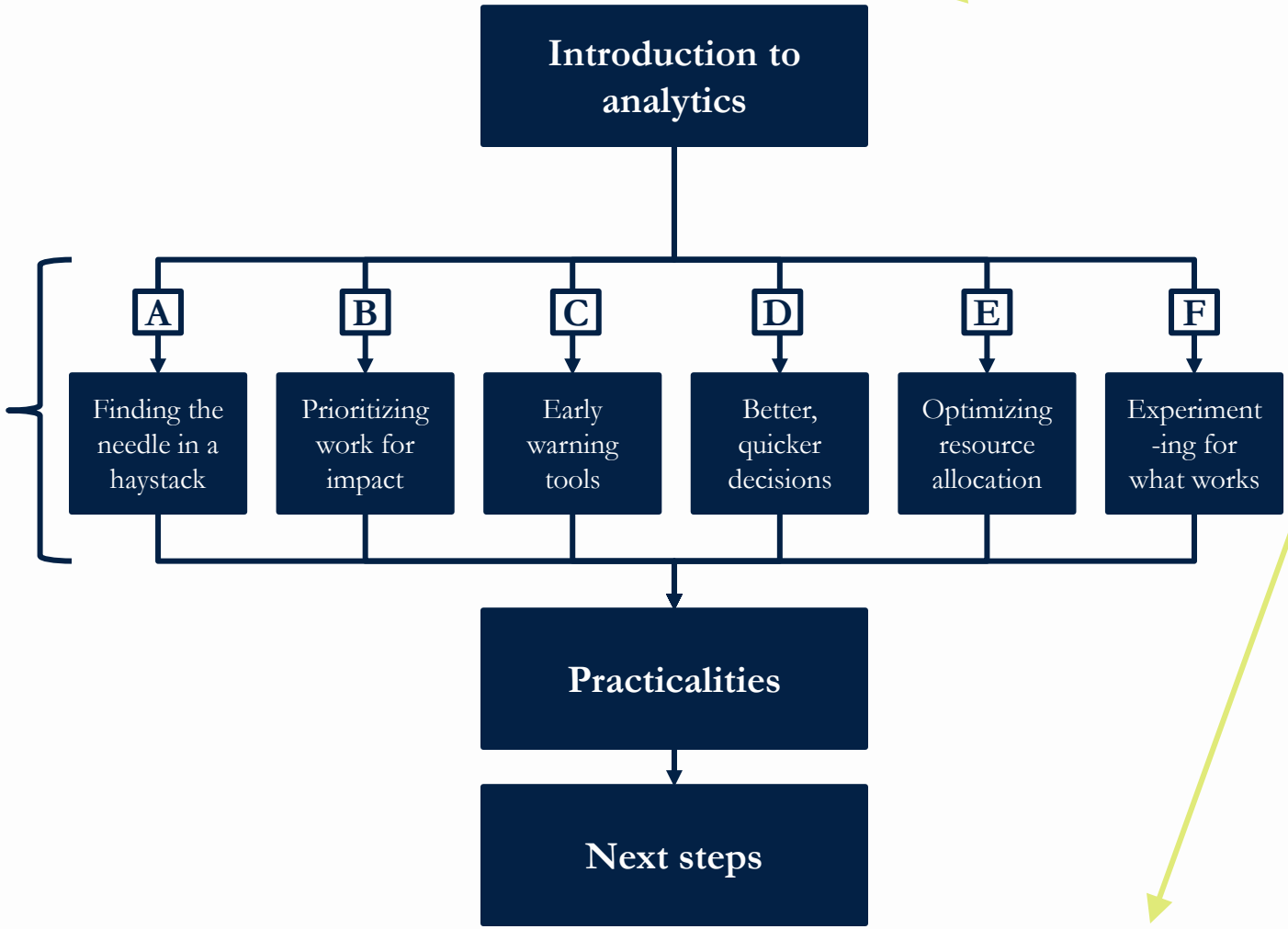
- Introduce the practice of using analytics to improve city services
- Provide examples of analytics projects delivered in NOLA and in other cities
- Provide guidance on identifying potential analytics projects in a department
- Lays out next steps for departments interested in OPA's support to explore analytics

We want this presentation to be a reference for departments in considering the role that analytics can play in supporting their work.

- Several projects are underway in NOLA, but cities across the country have shown that there are huge opportunities for analytics to improve services
- Given the range of analytics projects, some types of project will be more relevant to departments than others

Contact details for the team are at the back of the presentation; please contact with any questions.

Presentation map



What is analytics?

Analytics is the practice of using data to help government agencies work smarter.

Analytics has two elements:

Analysis
Using data to generate new insights and provide new actionable information

Service change
Using these to improve all manner of city services

Working smarter
Delivering better outcomes with the same level of resources

What is analytics? (cont'd)

Projects are designed around the needs and resources of departments.

Projects often use existing data. Insights that inform new ways of working are often derived from data already collected by department or other public sector agencies.

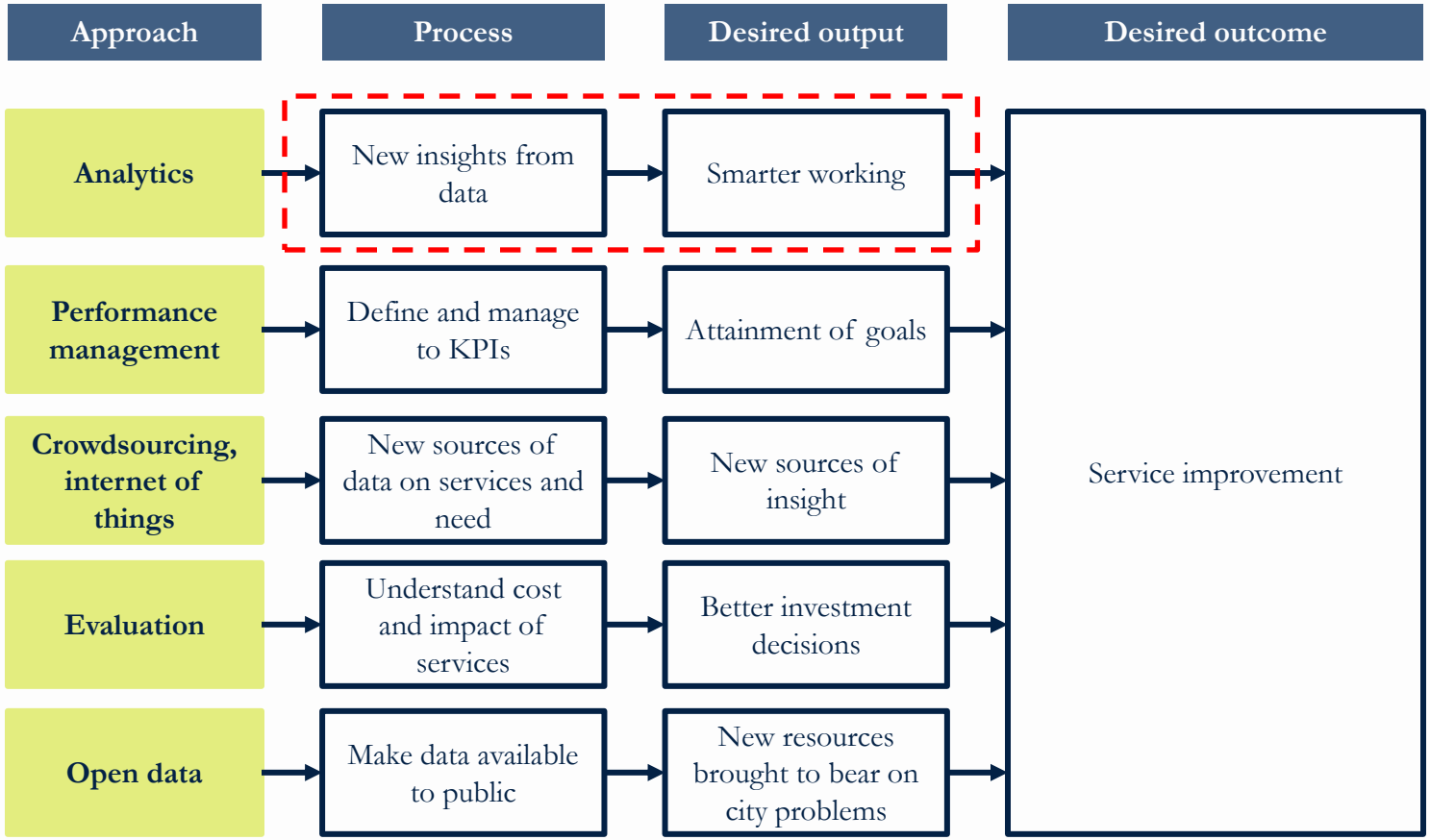
Projects can deliver improvements without service disruption. Often, impact can be delivered from just a small change in department working: ordering service delivery in a new way, or changing dispatch protocols.

Projects can be applied both to city services and the needs that they serve, namely:

- The supply of city services: working to improve in-house operation; or
- The demand for city services: analyzing the patterns of need which the city responds to.

What is analytics not?

Data can be a powerful tool. There are many other productive approaches to improving city services that use data and similar skills. Departments may use many at the same time.



Key learnings for departments

OPA supported NOFD to improve their fire alarm outreach program. Insights from the project are much more widely applicable.

The New Orleans Fire Department came to us to help them achieve their goal. **OPA provided the tools to NOFD to help them work smarter.**

We had presumed that the only way to find out whether a household had a smoke alarm was to go and ask them. **We were able to use existing public data to infer how likely it was that they had a smoke alarm before visiting a house.** This allowed a far more efficient targeting of smoke alarm outreach.

Impact was achieved with **only a small change in services**: changing the order in which houses are visited. No extra patrols, no more resources or disruptive changes required.

Introducing the range of project types

This following slides introduce the wide range of applications for analytics and provide departments with the tools to scope potential projects.

For the six types of analytics projects, we lay out:

- an introduction to the project type
- examples of where projects have been deployed in NOLA and beyond
- examples of symptoms in city departments that signal such a project could be productive

We examine each type of project and present examples as a way of introducing stimulating departments' own discussions of opportunities to use analytics.

Some sections will have greater relevance to departments than others; we suggest that this section is used as a reference.

Matching project types to departmental need

Analytics projects seek to improve departmental working. Any of the following characteristics present in your department, might present an opportunity:

- Taking repetitive operational decisions that could be streamlined
- Searching for a small number of non-compliers in a large number of applicants
- No way of organizing cases (or a backlog) strategically to maximize impact or efficiency
- Has not examined big decisions about how resources are allocated against operational data
- Operational staff are asked to deploy resources with incomplete information
- Services are reactive, because it is difficult to predict need
- Rely upon action from citizens, but behavioral nudges have not been optimized

A) Finding the needle in a haystack

Predictive modelling can be used to pick out targets based on existing data sources.

Example problem

- **Searching for regulatory non-compliers.** Regulatory teams are tasked with identifying a small number of problem businesses. They must sift through thousands of applications, often with only the option of a random audit, which is time-consuming, places burdens on compliant businesses and has a low conversion rate.

Potential solution

- **Predictive modelling uses data on old infractions to identify those at highest risk.** The characteristics of filings from businesses who have broken rules in the past can be used to predict the types of business most likely to be non-compliant in the future. This can be used to create tools to select cases for audit; audits can be randomized over this higher-risk group, with selection criteria refined over time.

City case study

- In assessing compliance with restaurant waste disposal regulations, NYC cross-referenced industry data on grease production with restaurant permit data and sewer back-up data from city agencies, allowing them to better-predict waste violations and to target enforcement.

Case study source: Harvard Ash Center

A) Examples of projects

	Distribution of fire alarms to at-risk households in NOLA	Business tax compliance in NYC
Symptom	Household visits to distribute fire alarms were struggling to find the small number of vulnerable families that needed them.	Goal to increase corporate taxpayer compliance. More of the same - simply increasing the total number of audits - not possible with manpower and burden on taxpayers.
Analytic approach	Using public data from national household survey, characteristics of households likely to lack smoke alarms (and highest risk of fire death) modelled.	Looked for patterns in the characteristics of non-complying business, based on years of
Service changes	Smoke alarm outreach focused on most at-risk neighborhoods	Minimal: audits targeted on those most at-risk of non-compliance
Impact	Homes in need of smoke alarms found at twice the rate as going out at random	Reduced % of audit cases closing without change from 37% to 22% in three years; +40% productivity

Source: NOLA OPA

Source: Harvard Ash Center

A) Identifiers of potential projects

Any of the following symptoms suggest an opportunity for "needle in the haystack" approach:

Service targets a small number of individuals – either those at high-risk, or most likely to be non-compliers with regulation – and locating them is challenging. For example:

- Target clients are known to be distributed across the city and not easily located with current outreach programs
- In a sea of regulatory data, non-compliers are difficult to identify without a costly audit
- Priority service users are likely to use other government services and could potentially be identified in this way

B) Prioritizing work for impact

New ways of using information to prioritize high-impact or easy-to-resolve cases

Example problem

- **Backlog of pest control cases are processed without information on their potential severity.** Ordinarily, cases are investigated and dealt with in the order that they are received. Although pest control teams have insights as to which cases are most likely to lead to serious outbreaks, calls are not classified until an initial inspection.

Potential solution

- **Predicting the danger of outbreak posed by new cases before inspection, and reaching those cases first.** Using data about the location, timing and nature of the complaint and comparing this to past outbreaks, cases can be ranked according to the risk that they turn into full outbreaks. These cases can be prioritized with quicker inspection and/or initial deployment.

City case study

- In Chicago, after reviewing data on historic outbreaks, incidences of 311 requests related to garbage or broken water mains close to pest reports were used to identify severe outbreaks and trigger an immediate response.

Case study source: Harvard Ash Center

B) Examples of projects

	Tackling anti-social behavior in Boston	Improving college access in Mesa
Symptom	Anti-social behavior complaints dealt with in standard manner, but suspected small number of residences created large number of problems.	High-school attendance rates in-line with national average, but college drop-out rates were high.
Analytic approach	Agencies (housing, police, tax) pool data with incoming public complaints to create comprehensive picture of the city's most problematic residences	Using students' classes, grades, test scores, and attendances, built model that can predict college-readiness and drop out rates
Service changes	Prioritize and coordinate actions based on this intelligence: e.g. expediting enforcement proceedings by the Air Pollution Control Commission.	Enrolment support services targeted at most college-ready but not applying; support services targeted at students most likely to drop-out
Impact	Coordination of effort saw 55% reduction in police calls associated with 18 identified problem properties.	Greater impact with students that most need college support

Source: Harvard Ash Center

Source: Chicago DSSG

B) Identifiers of potential projects

Any of the following symptoms suggest an opportunity for "prioritizing work for impact" approach:

Work is currently assigned un-strategically: on the basis of first-come-first-served, randomly or constituent complaints.

Services allocate and engage with clients before important information on the complexity and need of a given case is known.

Services could be more efficient if high- and low-complexity cases could be sorted earlier, or if higher-need cases could be identified more quickly.

Service backlog contains cases that vary by complexity and need, but:

- Backlogs are dealt with in random or first-come-first-served order; or
- Information to sort these cases in a productive way is not available until a case starts.

C) Early warning tools

Predicting need from historic patterns to inform predictive deployment or new services

Example problem

- **Excessive force violations by police officers have huge negative repercussions in the community and for police careers.** Targeted early interventions could enable forces to prevent such interactions, rather than responsively dealing with the officers after an incident occurs.

Potential solution

- **Refine early warning system, identifying officers most likely to have negative interactions with the public.** These systems flag recurring complaints against officers and notify supervisors when certain thresholds were reached, such as a certain number of use-of-force complaints over a given period of time, so those supervisors could implement targeted interventions.

City case study

- In Charlotte, teams worked to enhance existing early warning tools by making better use of existing data. Combining information on officer demographics, training, payroll, on-the-job actions, internal affairs data, dispatch data, negative interaction reports and publically-available data, they were able to increase the accuracy of the CMPD system by 15-20% while reducing false positives by 55%.

Case study source: University of Chicago DSSG website

C) Examples of projects

	Lead contamination of homes in Chicago	Predictive police deployment in Huntington beach
Symptom	Large number of children thought to be exposed to lead paint in older houses.	US Open for Surfing draws c.500k visitors to the city every year. Police force of c.200 officers; city has limited resources to proactively patrol for offenses
Analytic approach	Built predictive model of exposure based on census data on the age of a house, the history of children's exposure at that address, and economic conditions of the neighborhood.	Real-time analysis of social media - targeting keywords such as "gun," "fight," or "shoot," – using this to identify where trouble might start.
Service changes	Allows targeted inspection of homes and provision of remediation funding before damage is done.	Pro-active deployment of officers or alert of on-site security, before incidents spiral out of control.
Impact	More vulnerable families reached before lead contamination has severe health effects.	Greater ability to deal with issues before crimes are committed and enhanced community engagement in predicting issues.
	Source: Chicago DSSG	Source: Harvard Ash Center

C) Identifiers of potential projects

Any of the following symptoms suggest an opportunity for "early warning system" approach:

Resources are deployed in response to need, rather than pre-empting it.

Services struggle to predict or respond to spikes in demand.

Department wishes to enhance preventative options, but investment is held back by inability to predict the occurrence of need.

Intelligence from the public on potential service need is available, but has not been brought into service decision-making in a structured way.

D) Better, quicker decisions

Recommendation tools can bring better, actionable data to operational decisions.

Example problem

- **EMS dispatchers are required to make dozens of daily deployment decisions, often with incomplete information.** Decisions can be delayed if crew readiness information is not available, or skewed if accurate traffic data not available.

Potential solution

- **Provide teams with traffic and hospital-turnaround adjusted estimates of crew readiness.** Using accumulated data on dispatches, delays in response times caused by dispatch decisions could be assessed. Identifying hospitals and traffic corridors that can cause delays in response time could allow teams to better identify optimal teams for deployment.

City case study

- In Louisville, dispatchers are supported with regular reports from computer-aided dispatch software which detailed patterns in turnaround times for specific hospitals and for specific crews.

Case study source: Harvard Ash Center

D) Examples of projects

	Blight in NOLA	911 dispatch in Atlanta
Symptom	Significant backlog in blight enforcement, in part due to bottlenecks in decision-making. Many complex cases where relevant information lacking.	Resources initially allocated to 911 calls were often inaccurate, wasting police trips or requiring waits for backup
Analytic approach	Use data on characteristics of previous cases where enforcement decision had been taken to grade new cases and refine information collected by field teams	Analyzed c.5m call records, developing a new tool to define workload after identifying that traditional notion of workload (dispatch volume) was a poor indicator of resource need.
Service changes	Code enforcement supported in making decisions of whether to demolish or foreclose on a blighted home	New set of decision-making tools for 911 dispatchers
Impact	1,500+ case backlog eliminated in less than 100 days	Better matching of need to 911 resources deployed.

Source: NOLA OPA

Source: Harvard Ash Center

D) Identifiers of potential projects

Any of the following symptoms suggest an opportunity for "better, quicker decisions" approach:

Services involve repeated operational decisions - such as those deployment, resourcing or enforcement – which create friction for the department.

Decisions taken by teams require significant judgement, due to lack of information, which could be supported with more structured information

Service teams are delayed in deployment or mis-deployed because decision-makers do not have important information in a usable format

E) Optimizing resource allocation

Improved efficiency from data-driven deployment of teams and assets.

Example problem

- **Ambulances' standby locations are chosen based on dispatchers' habits or their instincts as to where they could most easily get to emergencies.** Based on their personal experience, dispatchers and teams work with only a limited view of total EMS demand in the city.

Potential solution

- **Standby deployment based on city-wide analysis of accident patterns, traffic patterns and crew readiness.** Building on the insights of dispatchers and ambulance crew with city-wide data on accidents, hospital transfers and traffic, ambulances can be deployed in a way that improves coverage and reduces emergency response time.

Case study

- In New Orleans, a project is underway to map optimal standby locations for ambulance crews, given the patterns of emergency calls seen in the city.

E) Examples of projects

	EMS deployment in NOLA	Public school buses in Boston
Symptom	EMS response time above department aspirations. Standby deployment of ambulances is historical practice.	Bus routing has grown organically. City seeking to ensure best quality and lowest cost for children.
Analytic approach	Analyzing optimal standby placement based on response times, traffic patterns and historic call-out clustering.	Revisiting simple assumptions about bus routes and catchment areas; modelling scenarios based on traffic and pick-up data.
Service changes	Potential changes to standby locations of ambulances	Changes to bus routing and timetables
Impact	Targeting shorter response times to EMS call-outs	Targeting shorter bus rides for children at lower cost to the city

Source: NOLA OPA

Source: Datakind project summary

E) Identifiers of potential projects

Any of the following symptoms suggest an opportunity for "optimizing resource allocation" approach:

Department resources have been scheduled or deployed in the same way for a long time, despite changing patterns of need.

Delays in service response times could be reduced with smarter deployment of assets closer to anticipated need, or with scheduling which better matches spikes in demand.

With better information, teams could be deployed more flexibly geographically or across shifts.

F) Experimenting for what works

Experimental testing to refine and improve services

Example problem

- **Outreach tools, such as SMS texts, to Medicaid clients deliver low conversion rates.** Those at risk of missing important medical appointments are texted reminders, but impact seems to be limited.

Potential solution

- **Optimize SMS outreach services with local testing of different forms.** With relatively little disruption, different messages and timing of texts could be tested to find combinations that delivered maximum impact for different groups.

City case study

- In New Orleans, experimental A/B testing was used to refine the content of text message outreach to Medicaid waiver program recipients, to maximize conversion rates.

F) Examples of projects

	Take-up of free community health programs in NOLA	NYC Summons Redesign
Symptom	Low take-up of free, annual primary care appointments, contributing to poor health outcomes in the city	In 2014, c.40% those cited for low-level violations in NYC did not take the required responsive action, leading to automatic issuance of an arrest warrant.
Analytic approach	Experimental A/B trial of SMS reminders to those eligible for appointments, testing optimal messaging	Re-design of summons form to make it clearer and new SMS and phone call reminders to summons recipients, refined and tested with experimentation
Service changes	Minimal: automated randomization of SMS during trial. Refined messaging used in future texts.	Rescheduling of court timelines to facilitate greater access; other summons procedures left intact.
Impact	Positive responses to reminders increased by 60%	Impact to reduce reliance on costly arrest warrants being evaluated.

Source: NOLA OPA

Source: Ideas42 website

F) Identifiers of potential projects

Any of the following symptoms suggest an opportunity for "experimenting with what works" approach:

Low-cost engagement tools such as letters, texts and reminder calls are not used, or demonstrate low conversion rates that suggest a possibility for improvement.

Departments want to refine service tools, but local impact of new or established tools is hard to gauge before a full roll-out.

Summary of analytics project types

Opportunity	Underlying issue	Analytics opportunity
A) Finding the needle in a haystack	• Targets are difficult to identify or locate within a broader population	Predictive modelling to pick out targets based on existing data
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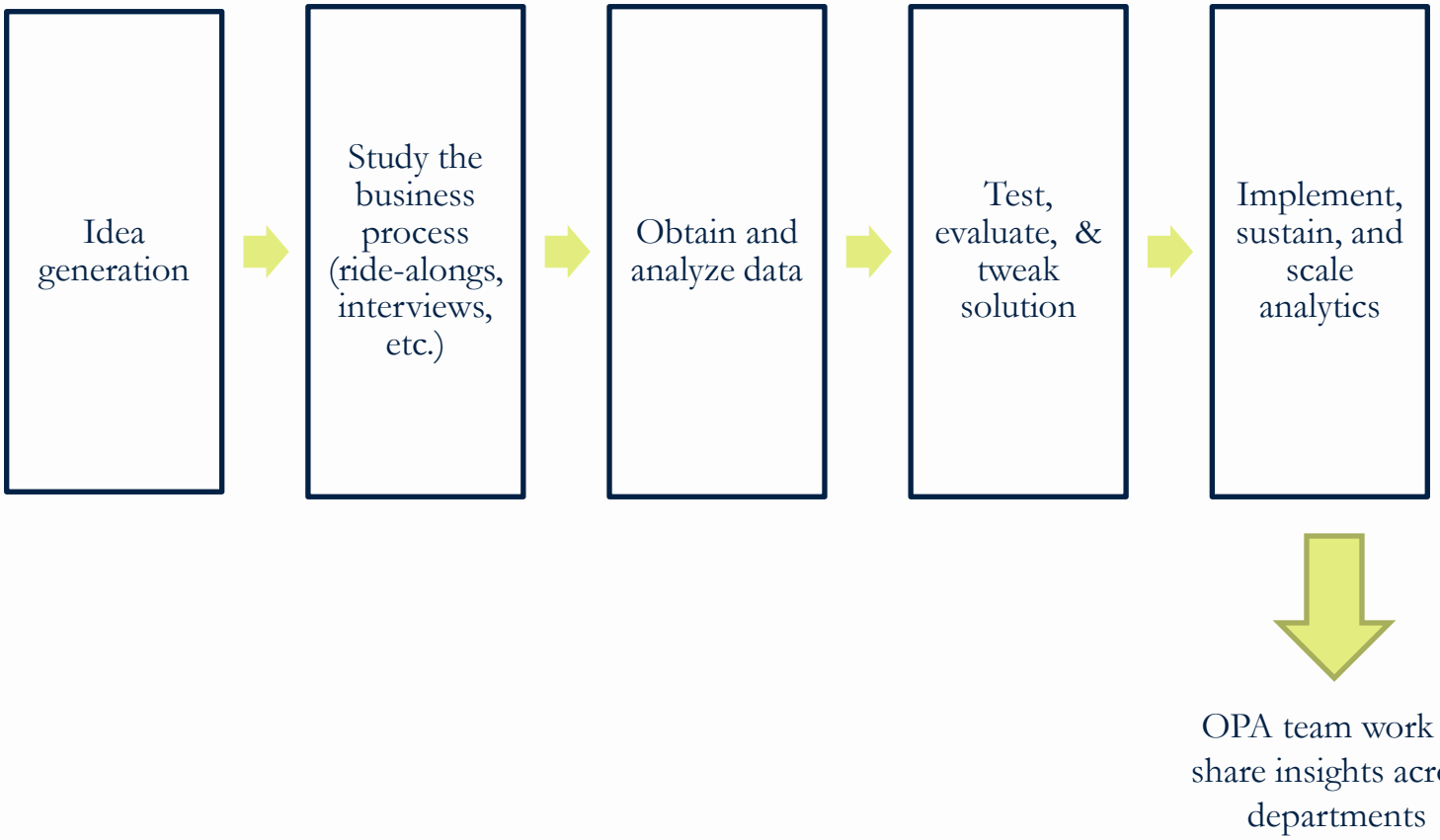
Analytics is a process, not a platform

The most successful projects have been born out of collaboration with departments and a process of ongoing engagement.



Process developed by Mike Flowers

Our screening process

OPA works with departments to build on suggestions, develop projects and to assess the project on these domains.

We are able to support the work of all city agencies, spanning health to infrastructure and from policing to human services.

We look for projects that are:

- **Practical:** meet a real need or address a problem within a department
- **Impactful:** would deliver substantial positive impact to residents and/or the department
- **Important:** aligned with mayoral priorities and have wider benefits for the city (e.g. replicability to other departments)
- **Feasible:** is relevant data available? Is there department sponsorship and capacity to support the project**?**

Assessing project feasibility

Much of the initial project scoping work done with departments focuses on the feasibility of the potential project

What new information or insight would the analytics project deliver?

How could this be created?

Is data that could be used to create this available in the department? Publically (e.g. from national sources)? From other departments?

How radically would services need to change to implement this insight? Is there support for such a change in the department?

Resources required from departments

Collaborative development is underpinned by access to the following departmental resources:

Sign-off for the project from a senior champion within the department.

Access to departmental operating data and records.

Access for OPA staff-members to departmental staff to learn more about department needs and conduct and ride-along sessions.

Cooperation of the department in evaluation of the analytic project so that it could be used in other city departments.

Memo: project initiation documents

These requirements come together in the following project checklist, which OPA completes with departments before starting projects

Criteria	Question	Response
1. Sponsorship (who)	Is there executive level sponsorship? Has a departmental POC been assigned? Has an OPA owner been assigned?	• Yes / No • Yes / No • Yes / No
2. Definition of Problem (what)	Has a problem statement been defined? What is the deliverable for this project? How will the deliverable be used – i.e., who will do what differently?	• Yes / No
3. Impact (why)	Does the project align with Mayoral priorities? Potential operational impact? Policy outcome to residents? Measurability of impact?	• Yes / No • High / Med / Low • High / Med / Low • Yes / No
4. Feasibility (how / when)	Is data available for this project? Can we tap into existing processes? Is there a political timing consideration? Is there capacity to implement?	• Yes / No • Yes / No • Yes / No • Yes / No
5. Spillover	Is this project replicable / portable? Will this project augment the data infrastructure of the City? Is the project sustainable?	• Yes / No • Yes / No • Yes / No
6. Data Readiness	Does data already exist? Is the data on data.nola.gov? Is the data in a central repository? Is the data machine readable, constantly updated and maintained?	• Yes / No • Yes / No • Yes / No • Yes / No

Next steps

We want to work with departments to identify potential projects.

We have put together a resource site on the city intranet for those interested in learning more.

A process of engagement with departments will begin in August 2016, starting with an open house meeting to explain the work of NOLAlytics and how interested departments can apply.

Following this meeting, departments will be able to submit short proposals for projects; we will follow-up individually with departments to explore how we might collaborate.